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THE COMMERCIAL CAR JOURNAL

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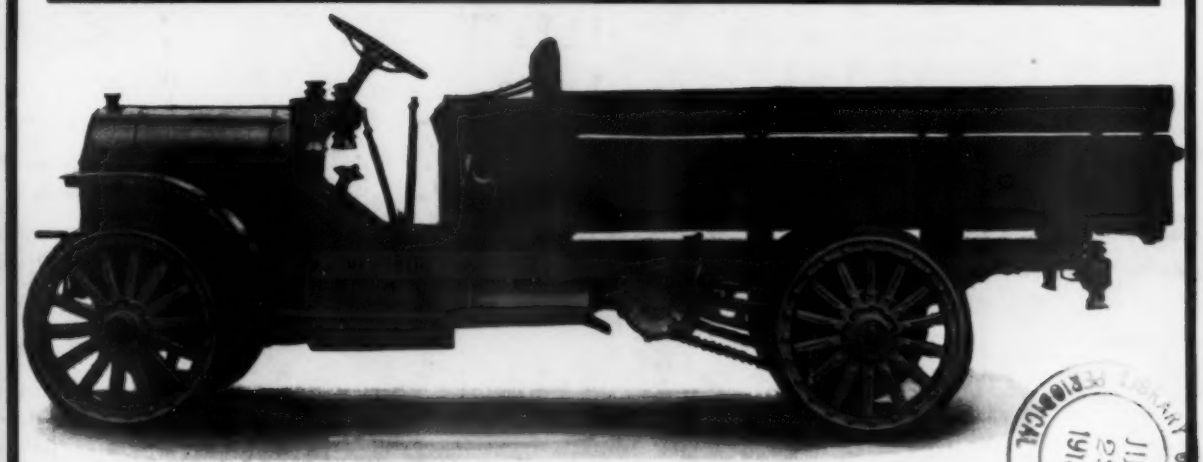

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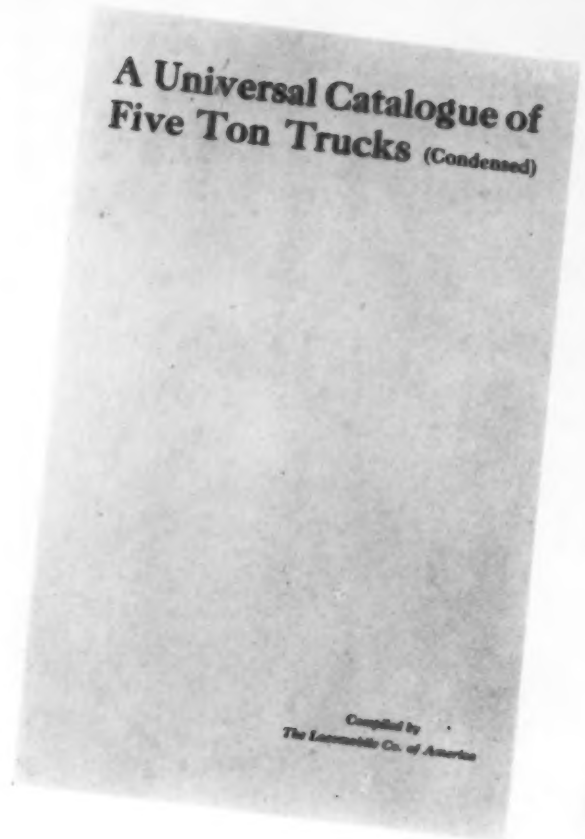

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MAKING ONE TRUCK DO THE WORK OF TWO

THE PUBLISHERS' PERSONAL PAGE

"Truth in Advertising"

The Baltimore Convention

The Baltimore Convention of the Associated Advertising Clubs of America devoted considerable time to the subject of "Truth in Advertising," which is their slogan, and also to truth in circulation statements, which should be the slogan of every publisher.

James Keeley, editor of the Chicago Tribune, addressed the Convention on the subject of "Circulation Lies," condemning in the strongest terms this practice on the part of the daily newspapers. At just about the time he was talking on the subject, the Supreme Court of the United States upheld the new postal law making it compulsory for daily newspapers to publish sworn statements giving the names of the editors, owners, stock and bond holders, and the average daily circulation, and forbidding, under penalty of a fine, the publication of matter for which they receive pay, without marking same "advertisement."

The Chilton Company is much pleased that this should become a law, as we have advocated this, not only for newspapers, but for all magazines and trade publications. The law thus far affects only the daily newspapers, and to just that extent it is good; but it should be extended to cover all publications such as magazines and trade papers. We can see no reason why such a law should be limited to daily newspapers, allowing trade publications and magazines unlimited latitude as regards false publication statements, and the publication of advertisements as reading matter.

James Keeley voiced the situation most aptly when he said:

"The circulation liar is not quite as old as Gutenberg types, but he is not much younger. He is not, I am glad to say, as numerous as he was years ago, but he is just as perniciously active as ever, and his influence is more devastating than at any time past.

As Guilty as Swindler

"These men who lie about their circulation, who defraud the advertiser, are just as guilty of obtaining money under false pretenses as is the cheap swindler who palms off a brass watch on a farmer under the pretension that it is gold.

"One of these days I hope to see this guilt made equal under the law. If any advertiser can be prosecuted and sent to jail for swindling the public, the publisher who defrauds the advertiser should occupy an adjoining cell.

"Once the real circulation liar sees the penitentiary doors opening, the situation will be clarified.

"I hope that the law will be so amended that it will be made obligatory on the editor, publisher, or owner, to sign the circulation affidavit personally. At the present time one in a subordinate position may sign the statement.

Hamper Honest Publisher

"The gentlemen whose tongues and pens print more papers in a minute than their pressrooms can turn out in twice their running time, not only cheat the advertiser but they also hamper you by hampering the honest publisher.

"The man who makes a truthful statement knows that his dishonest competitor will simply take his figures, add 10, 15, 20, or 50 per cent, get some one to swear to his tabulation, or fix his books and records, and get some auditing or investigating company to certify to the correctness of the figures handed to its representatives."

As has been pointed out by us before, there is no reason why a publisher should be allowed to obtain money under false pretenses, while this same misdemeanor in any other line is punishable by fine and imprisonment.

The upholding of the constitutionality of the newspaper publicity law, which was enacted as a part of the postal appropriation act of 1912, is certainly a step in the right direction, but it is not yet sufficiently comprehensive and should be carried a step further, to include all magazines and trade publications; and we urge a continuation of the agitation of this question, by the advertisers, by the honest publishers, and by advertising associations.

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USED IN EVERY LINE OF BUSINESS

THE AUTOCAR IN THE SERVICE OF A SOUTHERN FRUIT GROWER

The Autocar

Increases Business for Every User

The Autocar Company has specialized in the 3,000 pound Motor Delivery Vehicle. Every car is built either for the long-distance haul or the short run in suburban delivery.

One of our customers in Trenton, N. J., has made distant runs with their **Autocars** from Trenton to Reading, 180 miles, including loading and unloading, in 18 hours. From Trenton to New York City and return, a distance of 135 miles, in 12 hours; in fact all of New Jersey, and New York State as far as Yonkers, and Eastern Pennsylvania towns are reached by this concern with their **Autocars**. There isn't a horse-drawn vehicle that can do this, and even several horses in relays could not accomplish the feats which **Autocars** do daily. Practically 13,000 horses have been replaced by concerns using **Autocars**. Ask any **Autocar** owner and he will tell you THAT—

The **Autocar** is the most profitable vehicle for its capacity known.

The **Autocar** will get through places that cannot be reached with bigger trucks. Because of its lighter weight, and greater compactness.

The **Autocar** has a greater range of usefulness than other larger trucks.

The **Autocar** is always in service, because when not out on long trips, it can always be profitably employed in delivering around town.

The **Autocar** has a remarkably low operating cost.

The **Autocar**, by its greater mileage, proves the horse entirely inadequate for distant delivery service under modern competition.

The **Autocar** works without interruption in all seasons. Its advantages during the summer months alone, when horses are so affected by heat, warrant its adoption by all business concerns.

We have helped others to expand their business —we can help you.

Write for catalog, and full particulars and information will be mailed

The Autocar Company—Ardmore, Pa.

ESTABLISHED 1897

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PHILADELPHIA NEW YORK NEWARK BOSTON PROVIDENCE

MOTOR DELIVERY CAR SPECIALISTS

When Writing, Please Say—"Saw Your Ad. in the C C J"

The Commercial Car Journal

VOLUME V | PHILADELPHIA, JUNE 15, 1913 | NUMBER 4

Society of Automobile Engineers Entertains European Automobile Engineers

569 Engineers Take Extended Tour Covering Many of the Largest Automobile Factories, Parts and Accessories Plants

BY E. S. FOLJAMBE

THE Mid-Summer Meeting of the S. A. E. this year will go down in the annals of the society as the most enjoyable meeting yet held by the society. The pleasure of this mid-summer meeting was enhanced by the presence of the leading engineers of the industry in Europe, members of the Institution of Automobile Engineers, and the Society of Motor Manufacturers and Traders.

The foreign contingent arrived on the Minnewaska, which reached New York on May 26th. The visiting engineers were immediately taken in charge by the Committee on Arrangements, consisting of Howard Marmon, ex-officio, A. B. Cumner, chairman, A. L. McMurtrie, R. M. Lloyd and Coker F. Clarkson, secretary, and initiated into the mysteries of a beefsteak dinner and the various points of interest in New York. From there they went to Pittsburg and Indianapolis, where the Indianapolis Races were viewed; then back to Detroit, where the official banquet was held at the Hotel Pontchartrain, and thence for the three days' trip on the City of Detroit III, said to be the largest steamer on the Great lakes, sailing to the "Soo," and on the return trip visiting Mackinac Island, returning to Detroit on Saturday, the 7th. At Indianapolis the English engineers were welcomed by an address by A. O. Smith, who said in part:

"This gathering is a splendid sight and should prove an inspiration to all. This interchange of ideas and visits indicates much to me and the fact that all this is possible gives the key to the great and rapid development of the motor car. The liberal interchange of ideas is one of the great secrets of this unparalleled achievement. It isn't sufficient that our home engineers should get together, but when representatives of various nations can interchange ideas and discuss common problems we feel that it is good to live in this highly enlightened age.

With us in America, a comparatively new country, good roads are what we are looking to as the greatest agency for further expanding our opportunities. We have in contem-

Visiting Engineers Watching For the Birdie

plation a great national highway from the Atlantic to the Pacific which should serve as an example and will act as an incentive for the further development of good roads. It is my opinion that this national highway and the example it sets would be worth more to this country in the further development of conditions which broaden our market than would be the discovering of a new country with one-third the purchasing power of the United States."

What Took Place in New York, Pittsburgh and Indianapolis

The events which occurred in New York, Pittsburgh and Indianapolis were facetiously published in the daily S. A. E., a most enlightening sheet gotten out twice daily on board the City of Detroit III, the proceeds going to the help on the boat. From the S. A. E. Daily we extract the following:

"No sooner had the S. S. Minnewaska docked at New York 6:30 Monday afternoon, May 26, than the vampires of the S. A. E. swept down upon the poor Englishmen landing for the first time in a wild and unknown country. Amid warlike whoops the members of the I. A. E. were thrust into American cars and hurried post haste to the jungle room of Healy's restaurant, New York. Here for the first time they had thrust upon them all the manifest horrors of a beefsteak dinner. Dressed in caps and gowns, with heavy stone steins and corn cob pipes as the only weapons of defense, they were forced into the lair of the uncooked and indigestible American beefsteak.

Following the beefsteak dinner, the unprotected Englishmen were made to listen to speechos of welcome by Toastmaster Anglada, President Howard Marmon, P. D. Wagner, H. M. Lloyd and C. W. Spicer. Following these talks, they were verbally assassinated by members of the New York Committee and the general reception committee of the S. A. E. Messrs. Brown, Joy, Clarkson and Wheeler, of the invading party fought back feebly, trying to beguile the savage natives with expressions of appreciation of the hearty welcome which had been accorded them. But their guile failed, there was no escape.

Following a night of fevered restlessness, they were again corralled at the Hotel McAlpin at 8:30 Tuesday morning. There was a drizzling rain and a raw wind, but the poor Englishmen were forced to take an automobile trip to the alleged 'points of interest' in New York City, such, for instance, as the Woolworth Building, the Battery, Brooklyn and East River Bridges, the Aquarium and the service plants in Long Island City. Not content with having filled all the visitors with pneumonia germs, at the conclusion of the morning's run the party was dragged off to the Automobile Clubs of America to suffer the pangs of a buffet luncheon. Temporary respite was gained by bad weather, which necessitated the postponement of the baseball game. This at least the Englishmen escaped, but escaped only to worse horrors, for they were made to visit more points of local interest.

The following morning they were hustled on to a special train and dragged into the smoky depths of Pittsburgh.

Theirs was a breakneck series of trips first to the Pittsburgh Athletic Club for breakfast, then out to the Carnegie Homestead Steel Works, then to McKeesport with a tiresome trip through the National Tube Company factory, then back to Pittsburgh with a hurried dinner at the Fort Pitt Hotel and away to the train for the Indianapolis races.

The one thing about the 500-mile International Sweepstake that cheered the visiting engineers was the fact that a European car with a European driver and a European mechanician won the race. But even this triumph contained a sting, for the winning car burned American gasoline.

Beefsteak Dinner at Healy's Restaurant, New York City

Despite indications of mortal fatigue and the prospects of a breakdown in the near future, Saturday forenoon was spent in visits to the Wheeler and Schebler carburetor plants and to the home of the Prest-O-Lite lighting systems and starters. A luncheon at the Indianapolis Canoe Club prefaced a drive around the city to see more "local points of interest." And then in the evening followed the climax of all horrors, a barbecue dinner. Imagine, if you can, gentle reader, the effete English engineers attending such an orgy of barbarism as a barbecue dinner. But they had to do it or starve—and far be it from an Englishman to starve.

Following this they were not even given a chance to sleep in a respectable bed, but must needs spend the night in Pullman cars journeying to Detroit.

As soon as the train arrived in Detroit the British guests were dragged to the Hotel Pontchartrain. All day Sunday was spent in seeing historic points of interest about Detroit—chiefly tablets marking the victories of American soldiers over the British.

Monday forenoon the visitors walked 449 miles through the plant of the Ford Motor Company. At this point in the trip they fell to the ground exhausted, and were carried out by the Ford Red Cross contingent. This disaster, of course, precluded their seeing the balance of the Ford plant. It had been the hope of the Ford Company that they would be able to show them all departments by shunting them about the factory in cars, but the trip had to be called off in the early stages.

It was here that the astonishment of the Englishmen at the marvelous quantity production methods in the United States reached its limit, for be it known that C. B. Brown, President of the I. A. E., when going through the factory, was asked to mark with chalk various parts of the Ford car, when behold at the end of a pleasant ride to the Pontchartrain in a new Ford, it was

discovered that the entire car was made up of the marked parts and had been constructed as the party walked through the plant. If anything added further to the astonishment of the I. A. E. members it was when, wholly as a surprise, a new Ford was presented to B. A. Joy, Secretary of the I. A. E.

Digestion was materially aided by a trip through the plant of the Cadillac Company. The Cadillac is one of the most popular American cars in England—where American cars are so popular they are trying to pass a law to prohibit their importation. The evening was spent at the Temple theatre, where the British guests saw some of our wild west imitations of English music hall performing.

Sunday and Monday were then spent in Cleveland, Tuesday in Buffalo, where the party divided, part returning directly to New York, while the rest proceeded to Providence, R. I., where they spent Wednesday visiting the prominent manufacturing plants. On Thursday plants at Bridgeport and New Haven were investigated, and on Friday those at Hartford.

It was noticeable that the automobile engineers throughout the entire trip spent very little time in theatres or public places, but devoted themselves almost exclusively to their

S. A. E. and I. A. E. Banquet at Hotel Pontchartrain, Detroit
Howard Marmon presided, while Howard E. Coffin acted as toastmaster

Again a short but fevered night of near-sleep. About sunrise the advance guard of the S. A. E. was again upon them, and they were dragged out to the Packard Motor Company. The Packard plant is admitted to occupy a site of not less than sixty acres. The aisles through the factory are said have a lineal measurement equal to the distance from New York to San Francisco. All of this distance the British guests were made to walk between breakfast and luncheon. Moaning and begging for mercy they dropped into their seats in the Packard restaurant. Feverishly they attacked the food, and might have spent a reasonable length of time in eating and in digestion, but they were hurried away to the Timken Axle factory, where they saw the world's most famous bearings in the making. There was barely time between the return to the Hotel Pontchartrain and the starting gong of the evening banquet to get into dinner clothes. Immediately dressing was completed they were hurried to the large banquet hall, where fourteen courses, from tough celery to black coffee, including cocktails, still wine and champagne, were forced into their already 'aching voids.'

About four o'clock Wednesday morning most of them managed to break away from the S. A. E. members, who were figuring where they could spend the balance of the evening, and got to bed. Almost before the completion of forty winks this morning they were awakened and again dragged forth to visit the Hudson factory and the plant of the Continental Motor Company. Expecting peace and quiet for a few moments, they were hurried down the street post haste and rushed through the Chalmers factory, after which some of the Chalmers variety of home cooked food was forced upon them.

But at last they got aboard ship, Wednesday at 3 P. M. and sailed for the 'Soo.'"

hobby. Almost all of their meals and luncheons were served either on board ship or the train, or in automobile or parts factories, in fact it was such a strenuous trip that the one plea of the English engineers was to let them have a "wee bit of sleep." The luncheons were unique in many respects, for even the chefs, having been inoculated with the gasoline bug, served ice cream in the form of motor cars, even if they were of antiquated pattern, and even the croquettes and cakes often took the form of automobile parts and accessories.

The Voyage

It is perhaps due to the confinement on shipboard that each one in the party became acquainted with all the other members. Engineers from all parts of the United States were thus brought in contact with each other, and after the visits to the manufacturing plants there were many lively discussions, all of which cannot but help the industry as a whole, and tend toward universal co-operation and standardization. The boat pulled away from Detroit on Wednesday at 3 P. M., and the evening was given over to entertainment by the foreign contingent, who in various novel costumes, convulsed the members and their friends with humor, satire and burlesque on the American engineers, their cars,

factories and methods. Many jokes and witticisms were sprung which showed that the Englishman's appreciation of such humor has been very much maligned.

In the evening a special meeting of the Standards Committee was also held in the Ladies' Cabin, to which all were invited.

On Thursday morning the professional sessions began, being opened by an address by the president, Howard Marmon. The sessions were held each morning during the trip, and are taken up in detail at another place in this article.

Sault Ste. Marie

The boat arrived at the "Soo" in the afternoon of Thursday, the 5th, and there was immediately a break across the greensward for the stores, where ladies' wearing apparel, and all kinds of outlandish rigs were purchased and donned by the male members. The more dignified and sober-minded viewed the famous locks, the largest of their kind in the world. Here the engineers enjoyed the remainder of the afternoon viewing the construction and operation, as many large lake steamers were being warped through. All gathered at the boat at 6 P. M., with much noisy demonstration on the part of the decorated contingent, scrambling for pennies by the native youngsters, foot races for coins and other diversions. The merry party then embarked just as the Scotch Highlander with his bagpipes, who circled the boat three times daily announcing meals, was making his rounds. The hilarious contingent immediately tagged in behind the Scotchman and formed a triumphal procession, which it is impossible to describe.

HOWARD MARMON,
President of the S. A. E.

The evening was again devoted to entertainment by the Indians, who bound to the stake Howard E. Coffin, David Ferguson and E. T. Birdsall, as founder of the society, and each was harrowed by the most personal questions in regard to his product or connection with the industry. Coffin was labeled "one of the 48," and one of his assistants was then dragged in. On his back was the legend "the other 47." Marcus A. Smith, of the International Achesor Graphite Company, impersonating a "dago" was also held prisoner, and convulsed the assembly by his oration entitled "The Ball Base Game."

Chas. Wheeler, a member of the council of the I. A. E., and one of the speakers at the Hotel Pontchartrain was also captured by the Indians, and convicted of having become enamored of an Indianapolis maiden and missed his train. As proof the Indianapolis maiden (?), one of the long, lean, lank members dressed in female attire in the height of fashion was dragged into court. The acting was proof to the writer that several of the engineers had entirely missed their calling, and should have been in vaudeville.

A most festive appearance was given the entire assembly, there being some 569 of the S. A. E. party, by the "Hy-ats" of tissue paper presented by the Hyatt Roller Bearing Company, and by innumerable paper horns, of the "Kazoo" type presented by the Champion Ignition Company, and made to represent musical instruments. Dancing on the forward deck was enjoyed by large parties each evening.

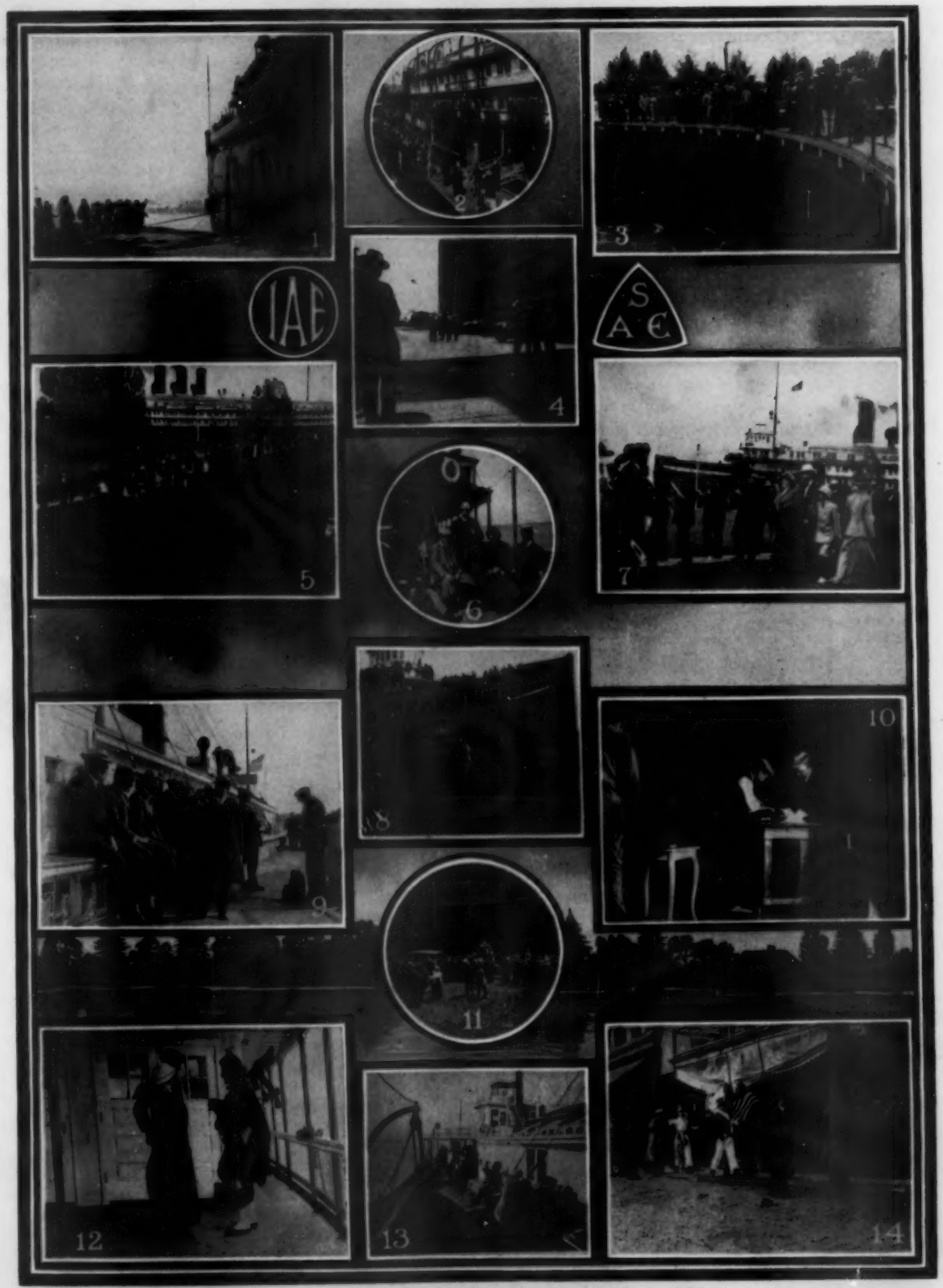
At Mackinac Island

On Friday at 2.30 P. M., the ship reached Mackinac Island. Unfortunately, it had been raining, but cleared gradually, the sun coming out in time to make the carriage tour and foot investigation of the island most enjoyable. Spooner was also enabled to take one of his famous "round robin" photographs, which for convenience we have opened out on one side and spread flat for the inspection of our readers.

The hilarious contingent at once pounced upon and captured all the hostelries of the town of Mackinaw. The afternoon was a most enjoyable one, as the island is full of points of historical interest, the fort occupying a prominent position, and affording a picturesque view of the town

General Committee on Arrangements, I. A. E. First American Visit

Alden L. McMurtry — Coker F. Clarkson, Secretary — Arthur B. Cumner, Chairman — Robert McAllister Lloyd



1. Urchins at the "Soo" Scrambling for Pennies. 2. The Embarkation on City of Detroit III, from Detroit. 3. The Great locks at the "Soo." 4. Engineers at the Hudson Plant. 5. Landing at Sault Ste. Marie. 6. Members and Friends Enjoying the Sunshine on the Forward Deck. 7. Triumphal Parade From the Steamer After Landing at the "Soo." 8. Sensational Dive by Gaidzik, Caught by the Camera After Six O'clock at Night. 9. On the Upper Deck; Our Editor Prominently in the Foreground. 10. The Daily S. A. E. Print Shop on Board the City of Detroit III. 11. Party Leaving the Chalmers Factory After Luncheon. 12. The Bagpipes Which Sounded the Welcome Signal to Mess. 13. Upper Deck: Spooner on the Spot. 14. Triumphal Parade Through Main Street of Mackinaw.

and harbor, while the rest of the island is densely wooded, and one succession of changing and brilliant views, as glimpses of the lake or harbor appear between the trees. The natural bridge, sugar-loaf rock, and other points were viewed. As the party returned preparations were being made for a high diving stunt, which was pulled off with great success by G. W. Gaidzik, closely seconded by Louis J. Schneider.

The Kimono Brigade

In the evening the most laughable entertainment was provided by the "Kimono Brigade," consisting of members of the New York local branch. In dreary monotone they sang of their troubles, and with hands on shoulders and lock step they filed in. They were supposed to be in Hades, and Herbert Chase in short skirts, gold wings and dainty pink stockings, held sway from the balcony above, and demanded of each why he was in such a predicament. Each member impersonated in voice and gesture with amusing cleverness the person of some one of the foreign engineers, with results which were most amusing. All the incidents of the trip, of the foreigners' business connection, of the cars they built, were in turn made the brunt of some telling joke or witticism, and for an impromptu affair great cleverness and ability was shown. "Angel" Chase liberated some, while others were condemned to the "cyanide bath" and others to "heat treatments."

Owing to the large number of members it was necessary to divide them into two groups, those eating at the first and those eating at the second table. Holders of red tickets were the favored ones, and the holders of the yellow tickets came second. Much diversion was created by attempts on the part of the yellow ticket holders to get by Hall, who apparently never slept or ate, but was always "on the job."

The next day, Saturday, June 7th, after the professional sessions in the morning luncheon was served in the dining salon. The dining salon is mentioned particularly, because a stand-up Dutch lunch had previously been served on the forward deck among the coal bunkers, and although the food was good, the setting was somewhat distasteful, especially to many of the ladies present.

The party arrived at Detroit at 3 P. M., Saturday, 7th: which finished the official portion of the trip. A large number of the engineers, however, accompanied the foreign members, taking boat at 10 P. M. the same evening for Cleveland, where the party was met the next morning and escorted to the Hotel Statler, an enjoyable Sunday being spent driving and sight-seeing. On Monday they visited the Peerless, White and Winton plants, while another section especially interested in tires took electrics to Akron, where they went through the Goodyear and Goodrich factories. The party left Cleveland at 8 P. M. by steamer for Buffalo, breakfasted on board the boat, and then were entertained the entire day by the Pierce-Arrow Motor Car Company, the party being met at the boat by motor cars, and being driven to the factory, with enjoyable light luncheon at 11. They were then driven to Niagara Falls, where the gorge trip, the Islands and the various drives, as well as one of the largest and newest of Hydroelectric Power Plants were visited. A comparatively small number then caught the 5.15 train for Providence, R. I., while others left for New York at 8 P. M., arriving the next morning. At Pawtucket they were entertained at the T. K. Club, visited the Potter & Johnson Plant, and were then conveyed to Providence by special trolleys, where they visited the American Locomotive Company, and enjoyed a luncheon at the Crown Hotel. In the afternoon they made a trip through the extensive Brown & Sharpe plant, winding up with a shore dinner at the Country Club. After spending the night on the train they arrived in Bridgeport the next morning, where they visited the Locomobile Company of America, and the Spring Perch Company's plant, the Locomobile Company supplying an appetizing luncheon. Motor cars then conveyed the members to New Haven, where they arrived early in the afternoon, and visited the works of the New Haven Carriage Company. The party put up at the Hotel Taft, and in the morning left by motor car for Hartford, where the plants of Pratt & Whitney, Pope Manufacturing Company and Hartford Rubber Works were in turn visited. The Pope Manufacturing Company, as hosts, served a very enjoyable luncheon. At 4 P. M. the party took boat for New York, arriving at 7 the next morning, June 14th, thus ending the most notable gathering yet held by the automobile engineers.

The Official S. A. E. Banquet at the Hotel Pontchartrain

In the beautiful banquet hall of the Hotel Pontchartrain, a most sumptuous dinner, including cocktails, wine and champagne, was served to an enthusiastic crowd, who were addressed from time to time by the speakers of the evening, presided over by Howard E. Coffin, as toastmaster.

President Howard Marmon, of the S. A. E., opened the speaking. Mayor Marks, of the City of Detroit, gave the official welcome in the form of two parchments for the S. A. E. and I. A. E., and offered the keys of the city. There were toasts to King George and President Wilson, and the assemblage sang "America" and "God Save the King."

Panorama Photo Taken

T. P. Brown, president of the I. A. E., voiced the thanks of his party for the unique hospitality, and many minor and detail kindnesses and courtesies which had been shown them during their stay in America, and hoped that arrangements could be made in the near future for the American engineers to again visit Europe. T. C. Pullinger, member of the council of the I. A. E., also made an address, in which he laid stress upon the custom in his factory of hiring time expired soldiers and sailors, who are usually young men willing to learn and who make excellent factory mechanics.

Chas. Wheeler, also a member of the I. A. E. Council, spoke at the banquet on behalf of the Englishmen. The hit of the evening, however, was the talk by H. M. Leland, who held the assembly with his homespun remarks on the automobile industry. His talk centered around two words, "Knowing How." His very much to the point remarks are here published almost verbatim for the first time.

ADDRESS OF HONORABLE H. M. LELAND

R. H. M. LELAND: Mr. Toastmaster, invited guests, our friends from abroad; it is a great pleasure to be here to-night and to look into your faces.

Gentlemen, I am just going to give you to-night a little shop talk. You know that is something we are not allowed to do on ordinary occasions. We have to prepare something fine, elegant, scientific, modern and up-to-date, and brimful of new ideas, no matter how absurd or ridiculous they are—they are all the fad nowadays. To be old-fashioned is out of fashion, but I am going to be real old-fashioned to-night and talk to you about the shop practice, about an ideal automobile plant; not one that is located in Detroit, perhaps not one that is located anywhere at the present time—I don't know if there is such a one; but an automobile plant that might be, and that I believe will be, in full operation some time, and I believe you will all be interested before I am done in some of the things I will tell you about that plant. All of you who have gone into the automobile business and are interested in it, of course, desire to make a success. Now, there are a great many different ideas of success. Some think that a man who is employing large numbers of men, and has acquired great wealth, has been successful. Not necessarily—not at all. It all depends. A man who has acquired great wealth and who is employing large numbers of men successfully, who has always played fair, who has always treated them justly and equitably, and dealt fairly by everyone, and done his duty faithfully and has been a clean, straightforward, honest man, that man is a huge, grand, and a noble success. (Applause).

I was asked once upon a time how it was that a certain concern made such an excellent product, sold that product for such a reasonable price, and at the same time paid very handsome dividends, and the question was propounded to me to explain how that could be done. I told them it was easy to answer, and I answered it in two words, and those two words are simply, "Knowing how." Then, afterwards, I spent considerable time in explaining just what I meant by "Knowing how." (Laughter).

Now, the art of "Knowing how" to manufacture an automobile, to make a good automobile, and to make it for the least possible money, is a great art. It is a great art, and it is not being practiced in Detroit to-day. (Laughter and applause). Now, one man thinks that he can do it by getting Mr. Taylor to come in and study in his plant two or three days and leave a whole lot of different methods of keeping records, and telling him all about his scientific management, and he has got the art when the other fellow goes away; and he cocks his hat back on his head and thinks he is—well, I was going to say, if there are not any young ladies here, I was going to say, "hell of a fellow" (laughter and applause). Another fellow, he has studied Emerson, and another one has studied Kent, and another fellow has listened to the eloquence of my friend, Mr. Hawkins (laughter), and they have imbibed the wisdom—and I am not trying to throw any mud or any reflections upon any of these gentlemen I have named—they have all done grand and noble things and there is something to it all, but the great problem, the great thing that will accomplish so much when you have done all that those people have ever said in their lectures and all they have written in their books, the main issue is left unsaid, and it is so simple we don't take any notice of it. It is the things that we learned when we were children in the old-fashioned days. I do not know whether the children will learn it now or not. It is fashionable now to live in flats and not have any children. Most people now say the modern young couple live in a little flat with four by six rooms, and the woman raises nothing but poodle dogs and hell (laughter and applause). But in the old-fashioned days we had mothers—real genuine mothers—and they taught us old-fashioned common sense. And I will tell you a secret, gentlemen from abroad, that is worth taking back with you. That old-fashioned, sanctified common sense is worth more than all the scientific investigations and time studies that ever were made (applause).

Don't worry, gentlemen, about the automobile business becoming dead—no more demand for them—because there is nothing in that. Don't worry about your competitors. Let your competitors see if you have anything good; take them in and show it to them and say, "For God's sake go home and improve on it if you can" (applause).

Gentlemen, I will tell you a secret, now, the one drawback, above all other drawbacks to-day to the automobile business is the bum, poor, damn fool automobiles that are being made (laughter and applause).

If everybody made good cars then there would be an immense demand for those cars. A reporter asked me out in Seattle, "How about this automobile business, is it all going to fritter away in a few days just the same as the bicycle business did?" I said, "Not on your life, why should it fritter away? It is the greatest blessing that has ever come into the human family, and anybody that wants to go somewhere and come back again purchases an automobile," and I said, "In this country there are one hundred million people and about thirty million of those people want an automobile and they want it real bad." And I want to tell you right here, because you may think I was prejudiced, I told him that seven million of these people wanted a certain type of automobile (laughter and applause).

on Mackinac Island

Now, Henry Ford is only making a thousand automobiles a day—he has not got fairly squared away yet—but at that rate he only turns out three hundred thousand a year, and it takes more than three years to get out a million—more than three years, see? (laughter). Henry, you ought to put on a double shift up there (laughter and applause). Now, you see how long it will take, don't you, to supply the thirty millions in this country, and you have not started yet, and China is just awakening (laughter). Why, talk about there not being a demand for automobiles; why, just as long as there are children born into the world they will all want automobiles (laughter and applause). So there is no danger of getting too many and don't worry about your competitors, why, they all help—they do a whole lot of advertising. Now, if you make a really good car that advertises itself, then the public are aroused to have an automobile by the other fellow's advertising and you give them the cars (laughter and applause).

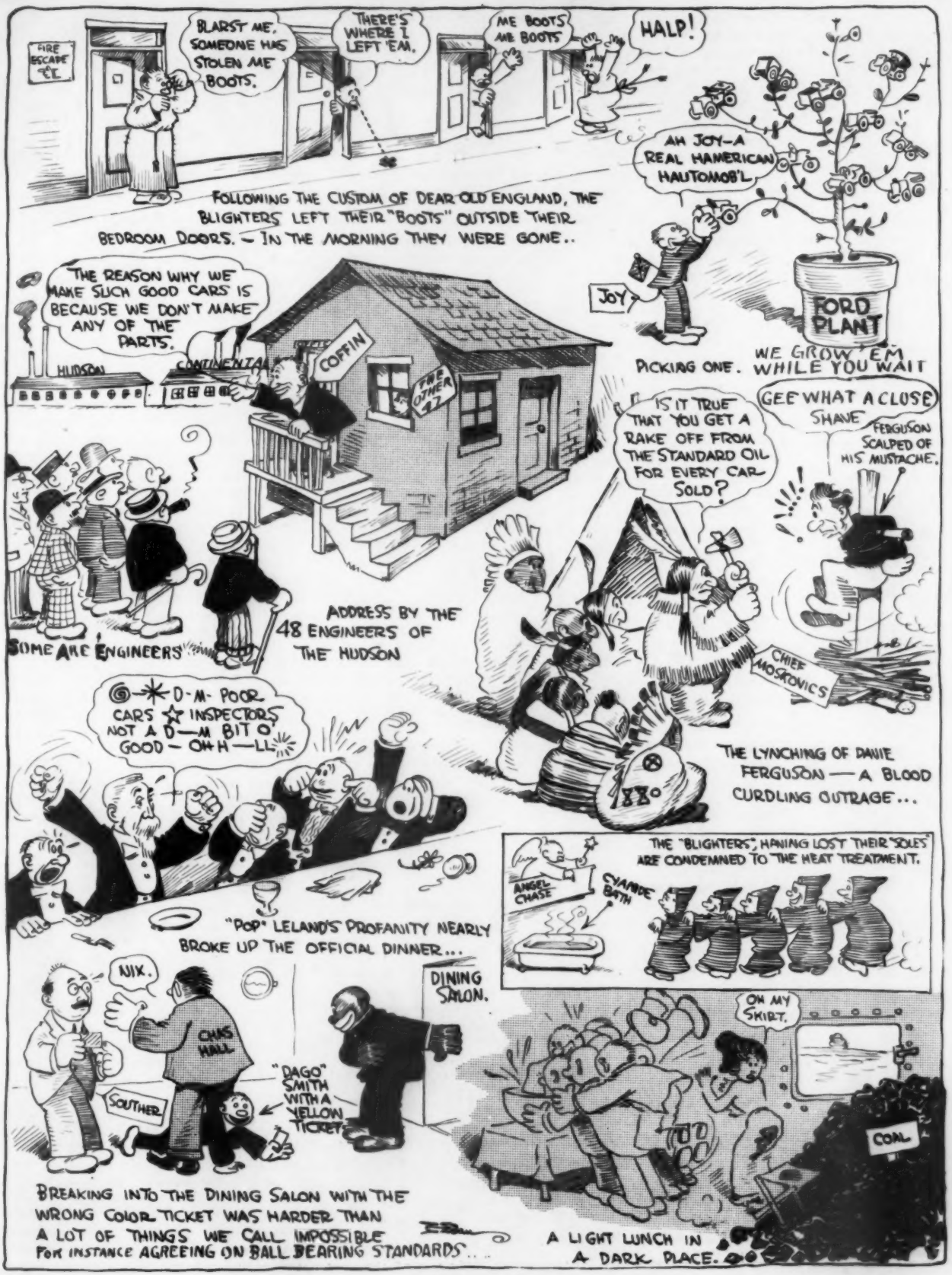
But I keep getting away from that ideal plant (laughter). Now, then, how is the man who knows how going to make this ideal car—because it is going to be made? Well, now, I tell you he will make it with entirely a different organization from the ones you see nowadays. He won't go down to New York, or some other scientific place, or theological seminary, and import a man who will be—(laughter and applause)—wait, boys, you don't give me a chance (laughter)—import a man to be a great potentate, infallible potentate, to sit here in the center—that is the great fad now, central organization—with a line running out here to this, out here to that, and you sit here and push the button and the concomitant in each of those places according to the record that he happens to be playing when he touches the button—see? (laughter). That doesn't make good automobiles. Now, how are you going to make a good automobile? You are going to design an automobile that you believe will be the best that the human art has conceived of up to the present day. It is going to be made strong enough to run at the highest speeds that our millionaires' sons will do when they are going home from a banquet (laughter), over the roughest of roads—it has got to be strong enough to stand all that. It wants to be made comfortable and luxurious so that our people will get into it and ride in comfort. It wants to have permanency and reliability so that when you start off you ain't going to have nervous dyspepsia thinking that you will never come back again. It wants to have all those things and then it wants to be taken apart, dissected piece by piece and decide of what material each piece shall be made in order that it may perform its proper functions adequately and correctly. Having done that with each and every piece in your automobile then you must decide how you are going to make those pieces. There comes in the great experience, and ability, and wisdom of this manager. He must know what the best machinery is. He must know the best that has been produced up to this date, and if perchance he finds after a year or two that a new machine has come out for any given purpose, that will do twice as much, or do the same amount and do it better, he cannot afford to keep the old machine. He must discard it and he will discard it. But, for each one of these pieces that he proposes to produce, he will buy the best machine that the world has yet produced to do that work with. Having his machine installed in his plant, he will equip that machine with the best tools and fixtures as the modern art and skill of mechanics can possibly produce and put upon that machine. Having got that far he will install an operator to operate that machine, and he will *teach that operator how to operate that machine*. Now, don't let that get away from you, because that is not the present practice. That is one of the simple things that we overlook. He will teach that operator how to operate that machine, that he will operate that machine in this way; running that machine at its most rapid speed that it is possible to run and maintain the accuracy that he proposes to have in this particular part, in order that it may perform its function. Then he will run that machine making the least possible number of cuts to secure the proper accuracy and get the result that he wants. Then he will run that machine at the coursest possible feed to get the accuracy that he requires. Then he will teach the operator to make that piece precisely right according to his test tools and his means of determining when it is right before he lays it down; and having gotten one piece right, he will immediately make another one just like that, and he will keep making them like that. Now, when he has made one piece, and ten pieces, and a hundred, and a thousand, and ten thousand, and they are all precisely right, I want to ask you gentlemen, in the name of common sense what can the inspector do to that piece? Don't you see he can't do a damn thing to it (laughter and applause)? Don't you see that you haven't any use for your inspector when you get at it that way. But that is not the method now. Now, I will come to that a little later. I have more to say about those inspectors.

Now, having done that with one machine, you will take that same course with each and every other machine. Now, pursuing that course and getting this particular product, having this kind of a machine operating in that way, don't you see that he is not going to worry about his cost department. He is not going to install a great big room full of typewriters where the girls and the boys are as thick as the men are in this room trying to determine what the cost is in a given department. He don't care a tinker what the cost is. He knows that Henry Ford or no other man can make those pieces any cheaper than he is making them and he hasn't got to worry about it (laughter and applause). He will save all that money.

But the great art is in teaching the young man how to do that, how to do it so that when he lays a piece down the piece is finished. Gentlemen, I will tell you something that is worth a span of gray horses to everyone of you. It costs less money to make real good high grade, first class work than it does to make bum, sloppy, miserable work (applause). Now, you can't do this work with militant organized labor. It can't be done. Militant organized labor has only one motive and that is to get along without work (laughter and applause). They are not trying to see how much they can do, or how well they can do it, but they are seeing how they can keep themselves on your payroll and get along and do just as little as they can (applause). You can't do that, gentlemen, with that kind of help. If you are running a factory in Detroit and are going to set up a new turrett machine, an automatic screw machine, or a milling machine, don't send over to one of the other automobile factories and get a fellow who has been running a machine there, a man who thinks he knows all about it, because the trouble with that fellow as a rule is that he don't know a blame thing about it that he ought to know. The only thing that he ought to do is to forget all that he thinks he knows, and then you should teach him how to run it, and run it and operate it correctly.

Now, where can you get those people? Watch trains as they come into town and take the young boys that come in from the country that have not yet been ruined by the temptations that will lure them in the city, or who haven't yet been spoiled by militant unionism, that want to work and want to get an honest living, you take those young men into your plant, give them some good advice, a good moral lecture, teach them and show them how to do this work, show them how to do it correctly, and tell them that they will have to do it that way if they stay with you. When you have done that with that one man and those ten men, and your one hundred men, and your one thousand men, and your ten thousand men, you have solved the problem and you can make the best car in the world for the least possible money, and it will be done some day. That is it. That is what I mean by "knowing how." That is about all there is of it. It is awfully simple, isn't it?

I haven't talked any about scientific management. I am not discouraging scientific management. I haven't talked about time study. What does the time study amount to unless the man who makes it knows how? I have seen in these United States of America new companies who were going in to revolutionize the world in the automobile business, go and spend their money for two hundred antiquated machines, antiquated in type and style, but new in fact, that had been discarded by other people, sold almost for scrap. They have put two hundred machines in there, when at the same time if they had known how, they could have gone and bought another machine that would do more work every hour than that machine would do in four hours. What about the smart man with the spectacles on who is making a time study of just what this machine is doing, that takes four hours to do an hour's work. What do you care about that kind of a time study? I say it doesn't amount to anything.


FIRE ESCAPE
BLARST ME, SOMEONE HAS STOLEN ME BOOTS.
THERE'S WHERE I LEFT 'EM.
ME BOOTS ME BOOTS
HALP!
FOLLOWING THE CUSTOM OF DEAR OLD ENGLAND, THE BLIGHTERS LEFT THEIR "BOOTS" OUTSIDE THEIR BEDROOM DOORS. — IN THE MORNING THEY WERE GONE..
AH JOY—A REAL HAMERICAN HAUTOMOB'L
JOY
FORD PLANT
WE GROW 'EM WHILE YOU WAIT
PICKING ONE.
THE REASON WHY WE MAKE SUCH GOOD CARS IS BECAUSE WE DON'T MAKE ANY OF THE PARTS.
HUDSON
CONTINENTAL
COFFIN
THE OTHER 47
SOME ARE ENGINEERS
ADDRESS BY THE 48 ENGINEERS OF THE HUDSON
IS IT TRUE THAT YOU GET A RAKE OFF FROM THE STANDARD OIL FOR EVERY CAR SOLD?
GEE WHAT A CLOSE SHAVE
FERGUSON SCALPED OF HIS MUSTACHE.
CHIEF MOSKOVICS
THE LYNCHING OF DANIE FERGUSON — A BLOOD CURDLING OUTRAGE...
D-M- POOR CARS ☆ INSPECTORS NOT A D—M BIT O GOOD — OH H—LL
"POP" LELAND'S PROFANITY NEARLY BROKE UP THE OFFICIAL DINNER...
THE "BLIGHTERS," HAVING LOST THEIR "SOLES" ARE CONDEMNED TO THE HEAT TREATMENT.
ANGEL CHASE
CYANIDE BATH
NIX.
CHAS HALL
SOUTHER
"DAGO" SMITH WITH A YELLOW TICKET
DINING SALON.
OH MY SKIRT.
COAL
BREAKING INTO THE DINING SALON WITH THE WRONG COLOR TICKET WAS HARDER THAN A LOT OF THINGS WE CALL IMPOSSIBLE FOR INSTANCE AGREEING ON BALL BEARING STANDARDS...
A LIGHT LUNCH IN A DARK PLACE.

Incidents of the S. A. E. Trip as Our Editor Saw Them

Now, I want to talk a minute about those inspectors. In saying this I am not speaking about the inspectors personally or individually. Some of the most conscientious and best men I know are inspectors, but the system as it is used everywhere is wrong, and there isn't any need for it, because these men are non-productive, and not only non-productive, but they are actually making you a great bill of expense and you are getting nothing for it. What is the process, the average process in the average factory? A man is starting up on a screw machine, he is making a lot of pieces, he has made ten thousand pieces, probably, and they are turned over to the inspector. The inspector begins to work on them. What does he do? He lays down one pile here. What are they? He knows none of them are right, but he lays down these because they are the best in the lot. Now, he lays down that pile. Then he lays down this pile over here, and those are not good enough. He thinks he cannot let those go through, they have got to be fixed over again. He lays this pile over here, and sometimes it is the largest pile, and he is going to scrap those; and he looks wise and proud and thinks there is a great field for him, and a great thing in the future, and he thinks what would become of that concern if he were not there to save it. That is the way he feels about it. Now, this pile that he is going to use on the right, they are only the best there are in the lot. The way I told you about, everyone of them is right, because the men don't make any that are not right, and when he has made a lot that are right, what can the inspector do to that? He can't do anything. Now, this second pile he has made here that are not right and got to be fixed over are taken back and they try to fix them over. It costs you more than if you had made them right in the first place, and then they are not satisfactory, but you conclude to use them. And then there is this very large pile that you throw in the scrap heap. All the material and all the work that you have done on them previously is thrown in the scrap heap, all because you have so much confidence in this system of inspection. It is not necessary.

Now, you say, "Well we have to have inspectors because we buy material from other people who do not make it as we want it." That is all right. That is the only need that you have got for your inspectors. Now, your job should be to train the people you buy from so that they will know that you will not take their work unless they send it to you absolutely right, and then you don't need any inspectors at all. Now, gentlemen, that is rather radical, that is extreme. You are not making automobiles that way. I don't know of anybody that is. I know one plant that doesn't have so many inspectors in proportion as some others do, and they turn out fairly good work. But, that is a fact; that is the right way to do it; that is the ideal way. Why, we do not look upon the undertakers as particularly progressive people (laughter). We do not look upon them as great producers, unless they are like my friend Pullinger here, who has got eleven children, thank the Lord. They are not producers. The undertakers are a non-productive class, and so are the inspectors (laughter and applause). They are just as non-productive. Do you get any dividends, gentlemen, out of your non-productive labor? I never knew anybody to.

Now, then, that is the art of it all. That is the great secret of it. It is the art of knowing how. It is a great art, and you can do it that way if you try. And, you can teach your men to work that way if you go at it right. It has been done. It can be done. It is the right way, and there is no other right way. And the right way my mother said when I was a little boy, and I never forgot it, she said, "The right way was just as good as any other way." (Laughter and applause).

N. E. Hawkins, sales manager of The Ford Company, gave a talk on "Salesmanship," which was almost as rapid as the methods of making Ford cars. Referring to Mr. Leland's remark that there were thirty millions of people in the United States to be supplied with cars, and that seven millions of these people were looking for a particular make of car, Mr. Hawkins thanked Mr. Leland for leaving the Ford Company the other twenty three million. In view of the enormous production of the Ford plant, which Mr. Hawkins is disposing of at the rate of two cars per minute, his talk carried much weight. It was terse, and every sentence was filled with good material, but he spoke at such speed that even the court stenographer was unable to catch the explosions.

J. B. Dunlop, the inventor of the pneumatic tire, was also a speaker, and his few remarks were listened to with marked attention. As the inventor of the pneumatic tire, he probably is as largely responsible for the remarkable advance made by the automobile industry as any man now alive.

Professional Sessions and Papers

Aside from the meeting of the Standards Committee on Wednesday evening, all the professional sessions were held on board the boat each morning at 9 o'clock. At the first session on Thursday morning, President Brown, of the I. A. E., spoke for himself and party, thanking the members present for the many courtesies shown, and he then announced that it was planned to make Howard Marmon, who is president of the S. A. E., the first honorary member of the I. A. E. This honorary membership will be ratified by the I. A. E. of England upon the return of the visitnig party.

Secretary Clarkson read a very satisfactory treasurer's report of the society, and also gave figures on the increase in membership. The presentation of a silver loving cup to him in appreciation of his valuable services and untiring work for the society came as a surprise. Milton Tibbetts sounded a note of warning in regard to the Oldfield Bill, which will greatly modify the present patent situation. It was moved and passed that a committee be appointed to investigate the patent laws and proposed changes. The committee appointed Milton Tibbetts, Herman F. Cuntz and Howard Coffin. At a later session the following resolution was presented by Mr. Tibbetts, and passed by the society:

> WHEREAS, it is believed that inventive genius is responsible for the greater part of our present material civilization; that the past and future development of science, commerce and manufacturing in this country depends largely upon invention; and that a wise administration of the laws relating to patents and to patented articles is a most necessary and desirable factor in the progress of this age.
>
> WHEREAS, it is understood that during the past year some seventy-five bills have been introduced in the Congress of the United States for the amendment of the laws relating to patents; and
>
> WHEREAS, it is further understood that one of such bills, known as the Oldfield Bill (H. R. No. 1700) providing for many radical changes in the fundamental principles of the patent system of this country, was introduced without due investigation and consideration of the laws and conditions which it so vitally affects; the Society of Automobile Engineers, therefore,
>
> RESOLVED: That the President shall appoint a Committee on Patents, who shall investigate the proposed patent legislation and report its findings and recommendations to the Society.

Mr. Souther reported for the committee on iron and steel. This report brought out considerable discussion, and George F. Fuller, of the Wymon & Gordon Company, of Worcester, Mass., objected to the adoption of the report on the grounds that the physical characteristics of carbon steel, as published on page 167 of the Bulletin, contained in the various tests some minor discrepancies. He advocated at least 100 tests of each piece, before any results were published. Mr. Souther answered by calling attention to the fact that these tests were not published with the idea of anyone specifying them to the manufacturer, and advocated the use of chemical specifications only, or physical characteristics only, and pointed out that specifying both at the same time might result in the steel manufacturers not being able

to supply such a steel. He advocated Shore or Brinnell tests of individual pieces, and stated that the table on page 167 was simply to connect elastic limit with hardness tests, and that it was not intended to be quoted in buying. He suggested that if a note to this effect were published at the head of the table, there could be no objection on the part of the steel makers to the report of the committee being accepted. Mr. Souther also called attention to taking the yield point or drop of the beam of the testing machine, instead of the elastic limit when testing soft steels, and the use of the extensometer in tests of hard steels, as no definite drop of the beam can be noted.

The report of the steel committee, with the note as suggested by Mr. Souther, to appear at the head of tables which could not be used in specifying materials, was finally adopted after some discussion.

The report of the ball bearing committee by Mr. Ferguson, was after some discussion referred back to the committee for final report at the December meeting. This was done in order that the ball bearing manufacturers might get together and decide on limits.

The paper on malleable iron castings, by Enrique Touceda, was then presented by the author. Mr. Touceda laid special emphasis on what should be specified in connection with malleable iron, and said:

"I believe that a mistake has been made in specifying an upper limit for silicon. As a matter of fact, it is well known that the higher the silicon in the white iron casting, provided the totality of the carbon in the casting exists in the state of carbide of iron, and all other conditions are correct, the better will be the finished product. I have shown that the manufacturer is obliged to elimirate his silicon to a point where all of the carbon will remain as carbide, and also that the extent to which he must carry out this elimination depends wholly upon the heaviness of the sections. It is exceedingly rare that he errs in getting the silicon too high, because he does not need a chemical analysis to safeguard this, as all that he has to do is to keep breaking his test sprue until he sees by the fracture that the iron is white, and that there are no particles of graphitic carbon in the fracture. He is more concerned in this particular than the purchaser can ever be, and to this extent the purchaser is protected. To specify an upper limit for silicon is about as necessary as to specify that the manufacturer shall pour his iron in the molds at a temperature sufficiently high to successfully run his castings. You can rest assured that he is going to look after the upper limit of silicon with as much fidelity as he will to be sure that the iron is hot enough to avoid trouble through misruns.

"On the other hand, it would be wise to specify a limit beyond which the silicon shall not drop, because not only does the manufacturer err frequently in this direction in the making of black heart iron, but he is handicapped by having no reliable means of telling just when he is on the danger line. Analysis would take too long and the fracture gives no true indication. If the silicon is too low, a very inferior product will result, and still the purchaser, if he be held to his specification, can be forced to accept the castings.

"The S. A. E. specification allows the manganese to be as high as 0.70 per cent. No one ever saw and no one ever will see black heart malleable iron of good quality with such a manganese content. Provided certain precautions are taken, and certain ratios made between certain elements in the product, it is possible to make a good product in which the manganese might be as high as 0.40 per cent., but to do so the manufacturer would have to be a master of his business and to know how to offset the evil effect of manganese.

"The upper limit for phosphorus given (0.20 per cent.) is all right, but it is actually the extreme upper limit that should be tolerated. The Society for Testing Materials allows 0.225 per cent. as an upper limit for phosphorus, but this is by far too high. I feel very confident that a good product could not be obtained if this limit were reached.

"No mention is made in the S. A. E. specification as to carbon content, or the permissible amount of combined carbon tolerated; nor is any limit placed upon the allowable amount of total carbon."

Mr. Souther, as chairman of the iron and steel division, thanked Mr. Touceda for the data given in his valuable paper.

A paper by K. W. Zimmerschied, on "A new Tensile Test Piece and Holder," was read and is herewith reproduced. It was suggested to have the proper committee investigate the new test piece and holder, with the idea of adopting it as the S. A. E. standard if found satisfactory.

A NEW TENSILE TEST PIECE AND HOLDERS

BY K. W. ZIMMERSCHIED

THE standard 2-inch tensile test piece of this Society, when made from steel with an elastic limit of 125,000 pounds per square inch or less, and when pulled as made, presents no particular difficulty. With the increased demand for accurate data on steels of much higher strengths, however, we have found this form difficult to use, for a number of reasons.

It has often been necessary to investigate the properties of a given steel under various heat treatments. In this case, it often happens that the stronger pieces of a series are too hard to machine without using heroic methods; threading the ends becomes especially difficult. If, on the other hand, the test pieces are first made in the soft state and then treated, instead of treating the ¾-inch bar and machining afterward, a new set of difficulties arise.

First, the quenching of finished pieces generally sets up high local strains in the threaded ends, especially when water quenches are employed. This can be obviated to some extent by protecting these threaded ends with a coating of asbestos silicate mixtures, or the like. Care must be taken, however, not to hold the butts too soft, or they will be too weak to withstand the load necessary to break the test length. In any case, oxidation of the threads will take place unless considerable precaution is taken to prevent it, and the resulting scale then makes it necessary to clean out the threads if close fits in the holder are to be obtained.

Aside from machining difficulties, however, warpage of the test piece during heat treatment is very troublesome. Suppose that a specimen is made up with twenty to thirty thousandths excess stock left on the diameter, to be ground after treatment. This specimen is almost certain to

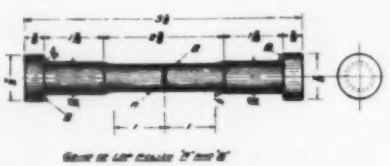


Fig. 1. Showing Test Piece—Which is Designed to Prevent Warpage

warp or bow up more or less on quenching—grinding will straighten out the test length, but the butts will still be out of line, and if the specimen is pulled in the ordinary holders, the loading is certain to be more or less eccentric.

It was to obviate all these difficulties

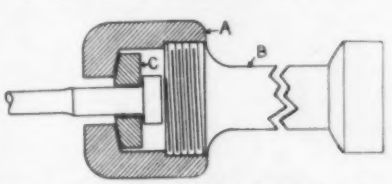


Fig. 2. Special Holder Devised for Holding Test Piece Shown in Fig. 1.

that the test piece shown in Fig. 1 was designed. This is made up from a ⅞ in. or 1 in. round bar in the soft state, leaving .030 to .040 in. on the test length diameter, and on surface "B." The advantage of this form from the viewpoint of machining cost is quite evident. Again, no ordinary heating or quenching operation will affect the specimen unfavorably, because of the absence of threads and of the fillets at all changes of section.

After treatment grinding of the test length and of the surface "B" with the same wheel will insure that, no matter how badly it is warped, the plane of load application will be normal to the axis of the specimen, and uniform in intensity, and a straight line pull will result.

There are still minor irregularities in the testing machine to take into account. In order to care for these, and to provide a rapid and convenient method for changing test pieces, the holder shown in Fig. 2 was devised. With a few explanations these figures become almost self-explanatory.

"A" is a sort of socket nut, which screws on to the end of the spherical headed bolt "B," which latter bears in standard blocks in the test machine heads. The hole in the socket nut allows of slipping the butt of the test piece through. The split ring "C" is snapped on to the shank and held with a rubber band; the nut is then screwed on to the main bolt. The operation is repeated on the bottom nut, and the piece is set ready to test.

As noted, the heads of both bolts "B" are ground in their sockets to a spherical bearing. The split rings are also ground to a spherical bearing in the socket nut—thus there is an unusual linkage employed, which can be relied upon to correct whatever small irregularities may exist in the machine or in the test piece.

It is also found that the fit between specimen and holder is so accurate and unyielding that extensometers may be applied directly to the holders with no commercial error. This is illustrated in the photograph; the saving of time necessary to apply ordinary extensometer clips is a considerable advantage. It goes almost without saying that these holders are made from heat-treated alloy steel of high strength; in them test pieces have been broken at maximum strengths of over 300,000 pounds per square inch.

Using this fixture on a large number of test pieces we find a very large percentage of the fractures showing perfect cups and cones, or stars perfectly centered—none bear evidence of a side pull. The test results are also more regular, duplicates agreeing considerably more closely than when using the old test pieces and holders.

In conclusion, the writer would confess that the fundamental ideas in this note are based upon the constructions used in well-known German testing machines; the advantages in this new form of holder are chiefly from the standpoint of simplicity in manufacture and use. For valuable aid in their design, the writer's indebtedness to Frank Burton, Concrete Commissioner of the City of Detroit, is hereby acknowledged.

PNEUMATIC TIRES

A very interesting paper was then read by P. W. Litchfield. He called attention to the youth of the industry, when we were enabled to have with us the father of the pneumatic tire, J. B. Dunlop. At the close of the paper Mr. Dunlop gave a most interesting talk on how he made, on the 28th day of February, 1888, with his hands and a pair of shears, the first pneumatic tire. As there was nothing of the kind made, all of the work had to be done by the cut and try method, and with sheet rubber of 1-32 in. thickness, glued together with rubber cement. This first pneumatic tire Mr. Dunlop made for his boy's bicycle, thinking that it would make possible an increase in speed, and when completed, this first tire was inflated with his son's football pump.

Harry Tipper then read his paper on lubricating oils.

The Friday Session

On Friday morning Mr. Slade's paper on motor truck wheels, extracts of which are herewith given, was read. In the discussion which followed, Lee H. Bowers, of the Schwarz Wheel Company, spoke on the shock absorbing ability of wood wheels, and also pointed out that the wood supply was ample, and that there need be no fear whatever of a shortage. He seemed to think that one reason for the use of metal wheels was the inherent tendency on the part of the engineer toward the use of metal rather than wood. W. E. Farrell, of the Treadwill Engineering Company, called attention to the fact that steel wheels in large quantities can be made at prices which will compete with the prices of wood wheels. Thos. Clarkson, of the Society of Motor Manufacturers and Traders, said that in his experience with the London omnibuses he had found steel wheels to be best on these vehicles, as wood did not stand up as well. The difficulty seemed to be due to weather changes, and although the wheels were hosed every night, they would show looseness after a time.

His statement in answer to Mr. Kilpatrick, of the Cleveland Worm & Gear Co., that he used worm gears on all his 'buses and found them all right was interesting to the American engineers some of whom have been somewhat skeptical.

W. P. Kennedy, chairman of the truck standardization committee, said that they had not yet progressed far enough to make a final report, but that they had appointed sub-committees in several cities, each to make a special research and digest, and report to the main committee on such subjects as wheel sizes, springs and axles, car equipment, auxiliary equipment, frame width, platform standardization, etc., and promised a comprehensive preliminary report at the mid-winter meeting. Mr. Kennedy also made a report for the commercial car wheel division, which was adopted by the society, and now becomes recommended practice.

Russell Huff, in the absence of E. F. Roberts, presented the paper on "General Inspection Methods." In this paper special emphasis was laid on the damage done in the factory and to the finished product owing to the purchasing department not ordering far enough ahead so that all materials, especially steels, could be carefully tested.

F. E. Moskovics, on account of lack of time, summarized his paper on the "Influence of the Sales Department on the Design of Motor Cars." This paper brought out considerable discussion, and the general feeling that there should be closer and more intimate relation and co-operation between the sales and advertising departments. G. W. Dunham, of the Chalmers Motor Car Company, called attention to blanks which they supply agents upon which the agents send in suggestions, with a minimum amount of work. Ten of their largest dealers supply them daily with reports on the cars which they repair.

The paper on wire wheels brought out a discussion of apparent interest and many opinions were expressed that the wire wheel was not destined to make the clean sweep of the wood wheel, which at first had been expected. President Marmon stated that to his knowledge two teams in the Indianapolis races changed from wire to wood wheels, alleging that at speeds of 75 to 80 miles an hour there was a distinct buckling, and subsequent springing back to shape of these wheels on the curves which interfered with steering. One of the foreign agents, whose car had been equipped with wire wheels stated that out of 150 agents, 140 advocated changing from the wire wheel to the pressed steel artillery type wheel, which is now gaining ground in Europe.

On Saturday morning, the resolution presented by Milton Tibbetts in regard to the Oldfield Bill was passed. Among the papers of interest was that of the consideration of certain problems of carburetion by Arthur B. Brown, there being apparently a large number of carburetor men present. The discussion was interesting, and would have continued indefinitely, many points of view being brought forward by different carburetor men present. Thomas Kimble stated that the problem was not so much one of proportions, as it is one of mixing of the fuel and air, and of heating.

B. F. Graham called attention to the fact that meters of all kinds, electrical and otherwise, cost from $50 to $150, while carburetors, which were actual meters of both liquid and air, and compensating for many variations in temperature, humidity, different speeds, etc., were expected by the makers at about $5 apiece. He said the real problem of the carburetor is to make it as good as you can for the small amount of money for which it can be sold. P. S. Tice, of

MOTOR TRUCK WHEELS

BY ARTHUR J. SLADE

IT is perhaps natural that wheels built of wood should have been developed to a high state of perfection in this country where such a large and varied supply of wood is available.

The majority of motor trucks built in this country have been equipped with wooden wheels; the earlier wheels conforming closely to the design of horse-drawn wagon wheels, especially with regard to size of spokes, but also, in some instances conforming to wagon wheel practice even to the extent of wooden hubs. Some of these wheels, dating back perhaps ten or twelve years, are still in service on motor trucks in New York City.

Development of Wood Wheels

The first radical improvement was in the substitution of metal for wood hubs, primarily to make possible the use of anti-friction bearings. Next came a radical change in the matter of spokes. When it is considered that a wagon wheel on a 5-ton capacity vehicle seldom has a tire exceeding 4 in. in width, whereas the tires on the 5-ton motor truck will usually total from 10 to 12 in. in width, it becomes obvious that the wide felloe on the truck wheel should be supported by a spoke of much greater width than the narrow felloe of the wagon wheel. Since 1907, when the importation into America of one of the most successful European trucks began, the improvement in the design, as well as construction, of wood wheels has been very marked. At that time one of our leading wheel builders undertook to practically duplicate these European wheels with spokes about 5 in. in width, flaring at the outer end so as to form an adequate support for the felloe and also of sufficient cross section to ensure a good shoulder on the end of the spoke against the inner surface of the felloe. Ever since that date the wheel builder in question has been manufacturing wheels, from designs similar to this, with great success; and, although some other wheel builders contended at the time that it was not feasible to procure wooden billets of a size suitable to finish spokes of such unusual dimensions, the majority, if not all, of the wheel builders catering to the motor truck industry are now building wood wheels of this general type.

Early Metal Wheels

It must not be assumed, however, that the practice of motor truck builders in this country has been confined exclusively to wooden wheels. As far back as 1858 and 1862 motor trucks are reported to have been built, in an experimental way, with steel wheels. In the years 1903 and 1904, when the motor truck industry in this country was making a definite commercial start, the Gibbs Engineering & Manufacturing Company equipped trucks with cast steel and steel disk wheels. The cast steel wheels were similar to those now being advocated by several manufacturers, having hollow spokes integral with hubs and felloes. They were made of crucible steel and used a tire constructed from a combination of wood, steel and rubber. About twenty 5-ton trucks were built and the wheels were found to be on the whole satisfactory. The disk wheels were made of boiler plate, riveted to cast steel hubs and to a steel tire band.

In 1905 the Couple-Gear Freight Wheel Company brought out a line of trucks equipped with wheels made up of steel plates. In the interior of the wheels an electric motor was mounted, and this same construction has been followed by that company up to the present time. At about the same time the Four-Wheel-Drive Wagon Company, of Milwaukee, brought out 5- and 10-ton capacity gasoline trucks equipped with wheels on which the tires were segments of rock elm and the side plates were steel disks. This company is not now in existence.

In 1906, a metal wheel, known as the "Indestructible Steel Wheel," was introduced to the market in Chicago. These wheels were built of side disks of steel, reinforced inside with structural shapes; the various members of the wheel being riveted together. They were used on trucks built by the Reliance, Commerce, Rapid, Plymouth, Grabowsky and Packard Companies, of which all but the latter have discontinued manufacturing, and the Packard Company only used a limited number. The Rapid Company is said to have continued their use the longest, covering a period of about two years. The severe strains and shocks due to irregular road surfaces are reported to have loosened the rivets holding the various members together, and the wheels were not found to be permanently satisfactory.

In 1908 the Morgan truck of 5 tons capacity was brought out with a disk type of cast steel wheel which proved unsatisfactory and was superseded in 1910 by a cast steel wheel with spokes of the general design with which we are familiar.

In 1909 the White Company introduced steel wheels on the larger sizes of their commercial vehicles. It is understood that modification of the design of these wheels was necessary to eliminate breaking of the spokes near their point of union with the felloe, and their present design seems comparatively free from breakage. The A. O. Smith Company on their heavy gas trucks have used cast steel wheels since 1911. The same is true of the Locomobile Company on their well-known trucks.

From time to time trucks have been imported from abroad equipped with steel wheels, notably the Orion, Bussing, Gaggenau, etc. However, the best known European trucks coming into this country are equipped with wood wheels, notably the DeDion and Saurer. I wish to acknowledge my indebtedness to Mr. Charles E. Stone, member of this Society, for his assistance in compiling the above facts.

Current Practice

It will be noted that comparatively few well-known truck builders in this country are at present using metal wheels and those who are using them have not previously used wooden wheels.

There is one notable exception, however, the Pierce-Arrow Motor Car Company, on some of whose trucks I have recently seen cast steel wheels, although since the introduction of the Pierce 5-ton truck on the market wooden wheels have been standard. It is hoped the engineers of that company will give us the benefit of their experience and their reasons for making this change.

The vast majority of motor truck manufacturers, including those whose product dates back to the beginning of the motor truck industry in this country, have used wooden wheels consistently, improving their design from time to time, but not abandoning a material for wheel construction which has on the whole proved entirely satisfactory.

Through the courtesy of Mr. George R. Wadsworth, member of this Society, I have been furnished with reports on the mileage and condition of the wood wheels on a large group of gas trucks of 3-, 4- and 5-ton capacity, which show that in some cases the mileage covered approaches closely to 70,000. On the assumption that the tire mileage secured on these trucks is 10,000 miles per tire, this would mean that some of the wheels have been subjected to six tire changes. The report states, regarding these wheels, that "they were all in first class condition and not a moment's inconvenience or delay has been caused by them and there is not the slightest indication of trouble in the near future." These wheels, it is scarcely necessary to say, are of modern design, are accurately constructed of suitable material, and are carefully inspected for conformation to the accepted S. A. E. motor truck wheels standards. The contention that wood wheels get out of round and present difficulties in tire application does not seem to be substantiated in this case.

As pointed out in papers on wood wheels, presented by Mr. Bert Morley and Mr. C. B. Hayes at the January, 1912, meeting of this Society, there is no question as to the adequacy of the supply of wood for wheel manufacture. The experience of many of our members with wood wheels on motor trucks, extending over periods of years, indicates that the truck manufacturers in this country are not being forced by necessity to adopt metal wheels.

When this Society visited our British fellow engineers, several members of the American party made inquiries regarding the service rendered by metal wheels, in both England and France, and the results of the investigation were set forth in a short report which I made to the Society at the January, 1912, meeting. Briefly, it was found that cast steel wheels were being used in England in a variety of forms. Also that structural steel wheels were preferred by some. Further, that the consideration of wood wheels had not been abandoned, even by those using steel wheels as a standard, and that some truck manufacturers preferred wood to metal, and used the former as standard. In France the wood wheel appeared to be the standard to the practical exclusion of metal wheels.

More recently Mr. L. C. Freeman, a member of this Society, submitted a paper on "Tendency of Foreign Motor Truck Design" at the January, 1913, meeting in which

he made the following statement: "While cast steel wheels seem to give very good results under certain conditions, they do not appear to be a universal panacea for all wheel troubles. One user who has operated a great many trucks of many different makes said that cast steel wheels were all right until the tires wore thin."

Claims for the Steel Wheel

What, then, are the specific advantages offered by metal wheels which should influence a motor truck designer to specify metal construction rather than wood? The advantage must be such that it can be proved to the purchaser of the truck that he will secure an actual financial gain by the change which the engineer proposes. * * *

First, it is claimed by one of our members, who is chief engineer of a company about to place cast steel wheels on the market, that: "It is now conclusively proven that there is a distinct saving in tires on steel wheels. Some of the largest tire manufacturers guarantee as much as 30 to 40 per cent. longer life on steel than wood." Inquiry made of the leading tire manufacturing companies, verbally or by letter, has failed to verify that statement. The opinion of several tire company officials seems to be personally in favor of metal wheels for the one reason that they are likely to be made more accurately to size, but the tire companies positively decline to guarantee an added mile or to even express the opinion that added mileage can be expected.

As to the question of accuracy of workmanship, it is entirely feasible for the wood wheel manufacturers, under the present S. A. E. Standards, equipping the wheels with S. A. E. bands, to work within the necessary tolerances and provide wheels which will have the accuracy required.

Another claim made for metal wheels is that their strength is greater than wood wheels. Assuming the cast steel wheels to be free from defects, and to have the chemical and physical characteristics recommended by the Iron and Steel Division, these wheels certainly develop marvelous resistance to shocks. I witnessed a test of such a wheel recently which was subjected to the impact of a weight swung as a pendulum against the side of the felloe and the wheel was deformed beyond the semblance of a wheel and even then did not show any fracture. At the same time, as has been pointed out by the Iron and Steel Division, steel castings can not be inspected against blow holes, and had the wheel in question contained some concealed defect, failure in testing would probably have resulted. The difficulty in securing uniform steel castings free from defects and conforming to the S. A. E. Standards is generally conceded. * * * As to the strength of well constructed and properly designed wood wheels, the front wheel of a truck manufactured by one of my clients came in contact recently with a road obstruction with such impact that the strain broke the steering gear, but the wheel was uninjured, and on another truck a rear wheel was subjected to such an impact that the axle spindle was bent without injury to the wheel. Therefore, on the question of strength, that of the high grade wood wheel is entirely adequate for commercial purposes.

The contention is also made that the metal wheel will dissipate heat more effectively than the wood wheel. There has come under my observation no case in which a truck tire on a modern motor truck has been injured by lack of heat radiation under service conditions.

Cost and Weight

The fourth point in considering the relative merits of wood and metal wheels is the comparative cost and weight. From information received from one of my clients regarding wood wheels being regularly manufactured and used on this company's trucks, and from information received from the chief engineer of one of the companies which is bringing out cast steel wheels, the following comparison of weight and cost has been made:

Set of wheels for 3-ton truck to take 36 in. by 5 in. tires, front; and 40 in. by 4 in. dual tires, rear; wood wheels equipped with S. A. E. band and Timken hubs and flanges—steel wheels having band and hubs integral—

	Weight		
	Wood lbs. each	Steel lbs. each	Increase of Steel over Wood per cent.
Front	122	151	12.4
Rear	212	373	76.0
Set	668	1048	57.0—380 lb.
	Cost		
	Each	Each	Per cent.
Front	$20.00	$26.80	34.0
Rear	30.00	52.10	74.0
Set	100.00	157.80	57.8—$57.80

Information obtained from a European manufacturer of cast steel wheels indicates that their weight is substantially the same as American cast steel wheels, but the price is 25 to 50 per cent. higher, thereby placing the steel wheel at a still further disadvantage as far as cost is concerned. Consequently, it would appear that the cast steel wheels are both costlier and heavier than the wood wheels. The burden of proof seems to rest with the metal wheel manufacturer, that they have an economic advantage over the wood wheels, resulting in a financial saving to the owner of the truck equipped with metal wheels.

Drop Forgings

There is one type of metal wheel which might overcome the disadvantage, real or fancied, of the wood wheel, and which would at the same time eliminate the risk always existent in a casting, and also the criticism of the built-up structural steel wheel, the loosening rivets. This is the drop forged wheel. Drop forgings of high grade steel, which after suitable heat treatments, develop extraordinary physical characteristics, would, in my opinion, be an ideal construction, unless their first cost proved prohibitive. I hope we may hear something from the drop forging experts among our membership in regard to the feasibility of such a construction for motor truck wheels.

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the Holley Carburetor Company, who has made some extensive experiments in the use of kerosene carburetors, said that the problem of compensation was a much simpler problem to the carburetor man than that of vaporization, and showed that from experiments 1¼ lbs. of kerosene per horse power hour, or 4 lbs. could be consumed, according to the heat applied.

In connection with the report of the nomenclature division, the S. A. E. members were much gratified by the statement from Chas. Wheeler, of the I. A. E., that no reports of the I. A. E. committee on nomenclature would be published without first consulting and co-operating in every way possible with the nomenclature division of the S. A. E.

"Measurement of Horse Power," by Professor W. Morgan, B. S. C., and B. W. Wood, M.A., was discussed, especially the fan dynamometers.

C. T. Meyers gave a most interesting talk on the "Acceleromiter," by means of which in four minutes observation and twenty minutes calculation, complete horse power curves of the steamship were made. The only additional data required that could not be read direct from the instruments was the weight of the moving body, which was obtained from the ship's officers. He made some very humorous remarks in regard to their corrections on this weight, such as the calculations of the quantity of refreshment aboard, both solid and liquid, which additional weight was added to that of the ship, together with the weight of the 846 passengers then aboard. Although these observations and calculations required in all not over 25 minutes, the resultant curves corresponded very closely with those of the naval architects of the vessel. This instrument can be used in a similar way on any automobile, and an investigation of its advantages was recommended to those present. The Acceleromiter is the invention of an Englishman. After votes of thanks to Mr. Cumner and his assistants on the arrangement committee, and to C. M. Hall, of Detroit, Clarkson and others who were responsible for the excellent arrangements and smoothness of the entire trip, the session adjourned.

(For review of additional papers read during meet, see page 53.)

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THE TRUCK WHEEL PROBLEM

SINCE the thought of a wheel has entered the head of a man, vehicles of every description have of necessity been supplied with this device which has been so aptly termed "a circular leg with a continuous foot."

Modern motor trucks were naturally fitted at first with wooden wheels similar in general construction and design to those used on wagons. It was soon found, however, that this type of wheel was unsuited for transmitting driving stresses, and that the old style of wheel was not correctly designed for a felloe width three or four times as great as had been used with the iron tires of ordinary wagons. Very soon the single wide solid tire gave way to the dual or twin type, which necessitated an extreme width at the rim. It was impossible in many cases to extend the rim inward toward the vehicle owing to lack of clearance. It was therefore extended outwardly, leaving the spokes far from the center of the felloe. This caused further weakness in the wheel, although it was possible to build massively enough to take care of the loads. Gradually a widening of the spokes at the point of junction with the rim took place, larger hubs were used and more spokes until the six-ton truck wheel of today is almost solid, so short and thick are the spokes, hub and rim.

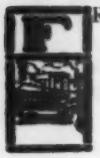
All wood must of necessity be more or less affected by temperature, humidity and other weather changes. Wheels made in the humid atmosphere of the east dry up and loosen in the deserts of the west. It has been claimed that difficulty has been experienced in making the wheels perfectly true and that their lateral resistance is not what it should be. This and other alleged weaknesses of the wood wheel for commercial car purposes gradually lead to the introduction of metal wheels. Cast steel wheels were made as early as 1858, but the use of metal wheels in this country may be said to have begun but two or three years ago. These wheels are made with hollow or solid spokes, usually well ribbed and fileted, but they in turn have their disadvantages. Flaws which are hard to guard against, may bring about weaknesses which cannot be foretold. Uneven cooling may set up stresses which will ultimately result in fracture. The modern cast steel wheel, however, is as a rule wonderfully strong, both radially and laterally, tests having shown that sound castings can be deformed out of all semblance to a wheel without actual breakage. Lack of flexibility that is a feature of the wood wheel, is cited as a disadvantage of metal construction, and in some cases the steel wheels are of greater weight. The claim is made that the steel conducts away the heat, producing longer tire life, but this has as yet not been substantiated by proofs, and tire companies do not make a practice of guaranteeing a longer life of their product when used on steel wheels.

Pressed steel built up wheels were introduced, but were not autogeneously welded or spot welded by electricity, as these processes were not well known at the time of the introduction of the pressed steel wheel. These wheels were of the dished disc type and were riveted together. They were ultimately discarded by most users, owing to the fact that weaknesses developed at the riveted joints, wear took place and the wheel loosened up. However, pressed steel wheels of special construction have been and are still used on electrics with motors in the wheels. Whether modern welding methods will make possible the general use of pressed steel disc wheels has not yet been determined.

Some eight years ago a pressed steel wheel of artillery type was marketed quite extensively in this country, but this wheel was brazed at the joints. A similar type of wheel is now being introduced quite extensively in foreign countries for use on heavy pleasure cars, and especially in England where second growth hickory of suitable quality for wheels is scarce. These wheels are apparently gradually displacing the wire wheels which have been used on pleasure cars, but it is an open question whether such a construction can be made economically enough to compete with good hickory wheels as made in this country.

There is an undeniable tendency on the part of engineers to replace wood by metal, but so far the wooden wheel has held its own in this country as far as trucks are concerned, and it is a question whether it will ever be displaced either by sheet steel of dish type, or even by the cast steel wheels which are apparently much in favor. The suggestion was made during the recent convention of the S. A. E. that perhaps high grade drop forge steel wheels which could be heat treated, might, if not too costly, offer a solution of the problem.

IMPORTANCE OF HIGHWAY IMPROVEMENT



ROM time to time the government is urged to make large annual appropriations for waterways, and the President, the Federal Congress and other departments of the government are each made to feel that there is a nation-wide demand for waterway improvement and liberal appropriations therefor. The improvement of waterways is considered by many of the government engineers and by members of Congress as an essential element in the development of our country. Not more than a year and a half ago resolutions were passed that not less than $50,000,000 should be appropriated annually for such work.

All of this may be and undoubtedly is true, but it simply goes to emphasize the fact, and one that is apparently overlooked, that improvement of the national highways and of the roads leading to and from terminal facilities, are every whit as important as the waterway improvements themselves. Of what use is it to gain important concessions in the way of rates as made possible by improved waterways, and then lose this advantage on account of almost impassable highways, over which the goods must be transported at the end of the water voyage.

Until the highways are improved so that modern commercial cars can handle the goods at the lowest possible rates, the greatest benefit from the improved waterways will be impossible.

Improved waterways are but a single link in the transportation chain, and the cost of living cannot be greatly reduced as far as the cost of transporting goods is concerned, until not only the link of waterways, but rapid handling at terminals of improved waterways and of suitable highways are each in turn perfected.

There is at the present time an agitation for improved road facilities, but this has been carried on almost exclusively by the automobile interests. Is it not just as much to the advantage of the business man, of the manufacturer, shipper, and the one who receives the goods, to have all methods of transportation reduced to the minimum cost?

We therefore urge renewed activity on the part of the automobile interests, and a concerted effort to interest manufacturers and users in all lines, in this great work of highway improvement.

Correspondence Received

FAVORS PNEUMATIC TIRES

One of the most important problems that confronts the designer of light delivery trucks is the question of pneumatic tires or solid tires. In an effort to eliminate tire trouble some designers of light weight delivery cars have adopted the obvious expedient of using solid tires. Without exception the results have been most unsatisfactory.

Even where spring wheels of various types have been adopted the use of solid tires has proven a serious mistake.

There are three chief disadvantages to the solid tire for use on light delivery cars—first, vibration; second, tire wear; third, increased gasoline consumption. The light weight delivery car must necessarily be operated at a speed of from 20 to 25 miles an hour in order to accomplish the work for which it is designed. At this speed, no matter how well the car is designed, the constant jarring of delivery service will very soon result in mechanical trouble. This simply cannot be avoided.

Some designers make the mistake of building their truck parts several times heavier than necessary, thinking thereby to make it possible to use solid tires. This, however, is a fallacy, for the very excess weight which they add causes additional strain on the entire mechanism. The force of every bump and jolt is magnified by the increased weight.

The second disadvantage is that a solid tire will heat up and deteriorate rapidly if the speed exceeds 18 miles an hour. I do not believe there is a tire company in America that will give a guarantee on solid or cushion tires if they know that the speed of the vehicle will exceed 18 or 20 miles an hour at any time.

The third disadvantage is increased fuel consumption. From our past experimental work we feel safe in stating that the gasoline consumption will be 25 per cent. to 30 per cent. more with solid tires than with pneumatic.

With demountable rims the truck user has little to fear from the chance of punctures. A tire can be replaced in a few minutes and the truck is then again in service. But mechanical trouble resulting from the use of solid tires requires hours for repair during which time the car is out of service—to say nothing of the expense of mechanical repairs.

Experienced truck users have learned the fallacy of the solid tires. John Wanamaker has been using motor trucks probably longer than any concern in America. At first Wanamaker demanded solid tires; now they will not buy a delivery rig with anything but pneumatic tires. They have learned by experience.

The New York Herald some years ago bought several Renault trucks. When the first pneumatic tires wore out they replaced them with solid tires. From that time on records show that the trucks were in the repair shop a considerable part of the time. Noting this the Herald people finally replaced the solid tires with pneumatic and at once the trucks resumed their former satisfactory service.

All this is true of every other concern that has had experience with motor delivery wagons. The little bit saved in tires is spent three and four times over in mechanical upkeep.

In my opinion it will be only a year or so till all prudent buyers of light delivery trucks will demand pneumatic tires for their own protection. I should be glad to hear the opinion of other engineers on this important subject.

STEWART MOTOR CORPORATION,
R. G. Stewart, Vice-Pres. and Ch. Eng.

BELIEVES GUARANTEE CAUSES TROUBLE

The article "Where is the Mistake" in the May issue of the C. C. J. is of great interest to one who is in the business, and should receive attention. The mistake originates with the manufacturer, who gives the buyer what he wants and not what is right.

The owner of the truck enlarges the mistake by his manner of use of same, the result of which is that the business is not what it should be and the retail agent is keeping away from the truck end.

The buyers of trucks are learning by the experience of others and their own, that a liberal use of common sense pays in the use of trucks.

The buyer expects too much and the seller tries to give it in many cases; there is nothing that receives the abuse and that more is expected of, than a motor truck, and if the user of a truck abuses his car, why should the seller try to give service; it is not done in any other line of business and it cannot be in this.

The buyer overloads, overspeeds, and undercares and the seller is expected to let him do it, and give service. The guarantee is only for defective parts, but it is taken by the user to cover wear and any abuse he may give the truck, and is the cause of much trouble. The writer's opinion is, that the sooner the guarantee is done away with the better for all.

The small agent can as well afford to give service properly as a large factory branch, but I contend that neither can do it as it is now being done, and think that the general financial conditions of the trade show the same.

Let all connected with the trade cut out the hot air and misrepresentation, forget the game and get it on a business basis.

VEERAC MOTOR COMPANY.
H. B. McGinley, Eastern Sales Manager.

NO SEPARATE ACCESSORY SHOW

The Motor & Accessory Manufacturers, Inc., who obtained an option on the Madison Square Garden, with the purpose of holding a separate accessory show at the time of the National Automobile Show next January in the Grand Central Palace, is understood to have decided against holding a separate show, and its members will show at the Grand Central Palace with the complete vehicles, but the association will hold its option on the Garden to prevent the holding of any independent show at the same time.

CASE NOT COMPELLED TO BUY STEPHENSON COMPANY

In the suit of the Stephenson Motor Truck Company, of S. Milwaukee, Wis., against the J. I. Case Threshing Machine Company, Racine, Wis., for breach of contract, in that the Case Company did not fulfill its contract to purchase the Stephenson Company, Judge Turner has dismissed the complaint and taxed the cost on the plaintiff, and the Stephenson Motor Truck Company will hereafter market its own trucks as well as manufacture them.

PATENTEES CANNOT CONTROL THE RE-SALE PRICE OF PATENTED ARTICLES

The recent decision of the United States Supreme Court, in the Sanatogen Case, in which it declares that a patentee who makes a sale of a patented article passes the title to the purchaser, and places the article beyond the limits of the monopoly secured by the patent. This will undoubtedly cause great change to take place in the marketing of patented articles. The court has further declared that the only way in which a patentee can control the price of the patented article is by never allowing the ownership title to pass to another party. That is, that they must sell the use of the article only, if they desire to control the price.

An association has been formed by manufacturers of patented articles for the purpose of furthering fair trade work,—to prevent price cutting and dishonest advertising, and to take care of legislative matters. It is quite possible that this association will outline a plan for the future sale of patented articles, which will enable them to still control the retail selling price.

WAR DEPARTMENT TO HOLD TEST

A test of motor tractors has been authorized by the War Department at the instance of the board of ordnance and fortification. As yet no date or place has been named for the holding of this test.

The board of officers that will be designated to investigate the problem will consist of an officer from the field artillery, one of the coast artillery corps, an ordnance officer, an engineer and a member of the quartermaster corps.

For sometime past the War Department has been watching the performance of motor trucks in various lines of trade and of late they have been paying particular attention to tractors, due largely to the success they have attained in European countries where they have been used in hauling ammunition and field trains generally.

It will be recalled that a year ago last February the War Department sent three trucks over the road from Washington to Indianapolis, Ind., going by way of the southern route. Though the trip was a very hard one, it was conceded at its conclusion that some very useful data had been gathered.

GEO. W. BENNETT HONORED

John N. Willys, president of The Willys-Overland Company, The Garford Company and The Gramm Motor Truck Company, in recognition of the remarkable results accomplished by Geo. W. Bennett in the upbuilding of the Willys concerns, has appointed him general manager of his various interests, and also vice-president of all the above

MR. GEO. W. BENNETT

companies. This announcement reflects the complete trust and confidence which Mr. Willys reposes in Mr. Bennett, and carries with it greater financial rewards and an increased interest in the Willys properties. Mr. Bennett has been equal to the rapidly growing duties and responsibilities which the rapidly growing Willys organization has heaped upon him to such a degree that Mr. Willys has practically left the management of the entire business to him during the past year, being absent from the factory for long periods.

Large plans are being made for future expansion.

MOTOR TRUCK CLUB MOVES

The Motor Truck Club of New York has moved and is now occupying handsome offices of its own in the United States Rubber Building at Room 1004. The membership at the present time is 215.

NEW AUTOMOBILE FREIGHT RATES

The following changes in Western freight rates have been announced by J. S. Marvin, General Traffic Manager, Automobile Chamber of Commerce, Inc., as a result of the meeting of the Western Classification Committee at St. Louis in April. These changes will be made effective in the Western Classification June 30, 1913 (with the exception of the rating on chains, the effective date of which is not yet announced), and will apply on all railroads west of Chicago:

Article	Present Rate	New Rate
Chains, Automobile Tire, in bbls. or boxes:	Less carloads, 1st class.	Less carloads, 2nd class.
Fire Apparatus, self propelling:	Carload: minimum 24,000 lbs. Class A. Less carloads, various ratings as originally intended for horse-drawn and hand apparatus.	Specific rating installed on same basis as automobile rates, viz: Less carloads, D-1. Carloads, 10,000 lbs. min. subject to Rule 6-B 1st class.
Folding Tops:	1½ times 1st class, carloads or less carloads.	Folded flat, in boxes or crates, less carloads 1½ times 1st class. In packages named, Carload minimum weight 10,000 lbs. subject to Rule 6-B 1st class.
Self-propelling vehicle springs:	2nd class, carloads or less carloads.	In boxes, bundles or crates, less carloads 2nd class. In packages, or loose, Carload minimum weight 36,000 lbs., 3rd class.
Front Axles, Mufflers and Radius Rods:	Axles, 2nd class, carloads or less carloads. Mufflers and Radius Rods, 1st class, Carloads or less carloads.	Front Axles in bundles or loose, less carloads 2nd class. Mufflers, in bbls., boxes or crates, less carloads, 1st class. Radius Rods in boxes, bundles or crates, less carloads, 1st class. Front Axles, Mufflers, and Radius Rods, in packages, or loose, straight or mixed carloads, minimum weight 30,000 lbs., 3rd class.
Rear Axle Assembly with drive shaft attached:	1st class, Carloads or less carloads.	In crates, less carloads, 1st class. In packages or loose, Carload minimum weight 30,000 lbs., 3rd class.
Fenders, Mud Guards, Mud Shields or Running Boards, steel, finished:	1st class, Carloads or less carloads.	In boxes or crates, less carloads, 1st class. In packages, or loose, straight or mixed carloads, minimum weight 30,000 lbs., 3rd class.
Frames:	1st class, Carloads or less carloads.	Loose, less carloads, 1st class. Loose, Carload minimum weight 20,000 lbs. subject to Rule 6-B, 3rd class.
Dashes and Steering Gears:	1st class, Carloads or less carloads.	In boxes or crates, less carloads, D-1. In packages or loose, straight or mixed carloads, minimum weight 30,000 lbs., 3rd class.
Automobile Wheels:	Without rubber tires: Finished, in boxes, crates or wrapped, Carloads or less carloads 1½ times, 1st class. In the white, loose, Carloads or less carloads, 1st class.	Without rubber tires: Finished, in boxes, crates or wrapped, less carloads 1½ times, 1st class. In the white, loose, less carloads, 1st class. In the white or finished, in packages, or loose, Carload minimum weight 30,000 lbs., 3rd class.

In addition to the changes shown above, worn-out rubber tires which are now rated as 1st class in boxes, same as new tires, will be given rating of 2nd class, when in bags, bales or bundles, and 3rd class when in barrels, boxes or crates.

Steel and Rubber Markets

Steel Weakens to $26.50

During the past month steel prices have shown some weakness, due to the fact that orders have dropped off until they are now only about one-half of the production, with a resulting decline in prices of $2.50 per ton; but the mills are still very busy and have many unfilled orders on their books owing to the very active demand during the winter. On June 12th the following prices were quoted:

Bessemer steel, per ton, mill	26 50 a 27 00
Open hearth, per ton, mill	26 50 a 27 00
Sheet bars, per ton	27 00 a 27 50
Steel bars, soft base, half ex., tidewater	1 56 a .....

The above prices are at tidewater in carloads and larger lots. For quantities less than 2000 lbs., but not under 1000 lbs., $2.00 per ton additional is charged, and less than 1000 lbs. $8.00 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots $2.00 per ton higher.

Gauge	Black	Galvanized	Gauge	Black	Galvanized
Nos. 22 and 24	2 10	3 10	No. 28	2 25	3 40
Nos. 25 and 26	2 15	3 20	No. 29	2 30	3 60
No. 27	2 20	3 30	No. 30	2 35	3 80

IRON AND STEEL AT PITTSBURGH

Bessemer iron	17 50 a .....
Bessemer steel, f. o. b. Pittsburg	26 50 a 27 00
Muck bars	30 00 a 31 00
Skelp, grooved steel	1 45 a 1 50
Skelp, grooved iron	1 75 a 1 80
Ferro-manganese (80 per cent.) seaboard	60 00 a 61 00
Steel, melting scrap	13 00 a 13 25
Steel bars	1 40 a 1 45
Black sheets, 28-gauge	2 25 a 2 30
Galvanized sheets, 28-gauge	3 40 a 3 50
Blue annealed, 10-gauge	1 75 a .....
Tank plates, ¼-in. and heavier	1 45 a .....
Wire rods	30 00 a .....
Wire nails	1 80 a .....
Plain wire	1 60 a .....
Cut nails	1 70 a 1 75
Barbed wire, painted	1 80 a .

Rubber Recedes to 90

After having rebounded from 78 to 93 cents per lb., as recorded last month, rubber prices are again sagging, the price having dropped to 90 during the last days of May. For the two weeks preceding June 12th, the price was practically stationary at this point, with only slight fluctuations, and indications would seem to show a strengthening market. On June 12th quotations were:

Up-River—	
Fine	90 a ..
Coarse	58 a ..
Island Fine—	
Island, fine	81 a 82
Coarse	37 a 38
Cameta	42 a 43
Caucho—	
Ball	59 a 60
Centrals—	
Corinto	58 a 59
Esmeralda	60 a 61
Guatemala, slab	46 a 47
Mexican—	
Scrap	59 a 60
Strips and scrap	55 a 56
Guayule	Nominal
Balata, sheet	72 a 73
Ciudad, black	50 a ..
Trinidad, black	Nominal
Africans—	
Massai, red	74 a ..
Red Congo	Nominal
Black Congo	74 a ..
Soudan—	
Niggers	Nominal
Accra, lb.	40 a ..
Gambia, prime	53 a 56
East India—	
Smk. sheets	78 a 79
Ceylon, bls. and sheets	76 a 77
Pale crepe	77 a 78
Borneo I	56 a 57
Borneo II	47 a ..
Borneo III	31 a 32
Pontianac—	
Pontianac, prime plantation	8 a ..
Palembang	7 a ..

SCRAP RUBBER, DOMESTIC

Boots and shoes	9½ a 10
Tires—	
Automobile	10 a 10½
Bicycle, pneumatic	5¼ a 5½
Wagon and carriage, solid	9⅜ a 9⅞

GRAND RAPIDS MOTOR TRUCK COMPANY, Grand Rapids, Mich., makers of the Decatur Truck; creditors have filed a petition in bankruptcy, claiming that the company has liabilities of $133,000, and assets of only $40,000. The petitioners are The Sheldon Axle Company, Jewel Steel & Malleable Company, Automobile Supply Manufacturing Company and American Metal Hose Company.

Conventions of Interest to the Trade

The list of conventions given herewith is published each month so that commercial car manufacturers can communicate with the proper authorities with the idea of arranging to give lectures, illustrated talks, statistics, etc., to show the advantage of motor trucks in these various lines; also possibly to show and demonstrate their cars.

National

June 24-26—at Chicago, Ill. National Hay Association; J. V. Taylor, Secretary.

July—at Minneapolis, Minn. National Hotel Keepers' Association; R. H. Hawkes, Secretary.

July 17-19—at Buffalo. American Society of Heating and Ventilating Engineers; E. A. Scott, Secretary, 29 W. 39th St., New York City.

July 21-24—at Omaha, Neb. (Rome Hotel). National Cleaners' and Dyers' Association of the United States, and Canada.

August 6-8—at Hotel Statler, Cleveland, O. International Apple Shippers' Association; R. G. Phillips, Secretary, Rochester, N. Y.

August 14-16—at Macon, Ga. National Electric Lighting Association; W. L. Southwell, Chairman of Executive Committee.

August 18-21—at Butte, Mont. American Institute of Mining Engineers; Bradley Stoughton, Secretary, 29 W. 39th St., New York City.

August 19-22—at Minneapolis, Minn. Society of American Florists; John Young, Secretary, 54 W. 28th St., New York.

August 25-30—at Cincinnati, O. (Hotel Sinton). National Association of Retail Druggists; T. H. Potts, Secretary, 122 South Michigan St., Chicago, Ill.

September—at Chicago. International Congress of Refrigeration and American Association of Refrigeration; J. F. Nickerson, Secretary, 431 South Dearborn St., Chicago, Ill.

September 22-24—at Chicago, Ill. American Meat Packers' Association; Geo. L. McCarthy, Secretary, care of *The National Provisioner*, New York.

October—at New York (Museum of Natural History). National Association of Gardeners; M. C. Ebel, Madison, N. J.

October 3-4—at Atlantic City, N. J. (Hotel Shelburne). United States Brewers' Association; H. F. Fox, Secretary, 109-111 E. 15th St., New York City.

October 12-17—at Chicago. American Institute of Metals; Secretary, W. M. Corse. Lumen Bearing Co., Buffalo, N. Y.

October 12-17—at St. Louis, Mo. Carriage Builders' National Association; H. C. McLear, Secretary, Mt. Vernon, N. Y.

October 14-16—at New Orleans, La. Grain Dealers' National Association.

October 15-17—at Richmond, Va. American Gas Institute; Geo. G. Ramsdell, Secretary, 29 W. 39th St., New York City.

October 21-25—at New Orleans, La. International Association of Electrotypers; R. J. Wilhelm, Secretary, 64 South Division St., New York City.

October 21-25—at New Orleans, La. United Typothetae of America; F. W. Heath, Secretary, 1650 Transportation Bldg., Chicago, Ill.

October 24—at Chicago, Ill. American Iron & Steel Institute; Jas. T. McCleary, Secretary, 30 Church St., New York City.

Fire Associations

June 24-26—at Abbeville, S. C. State Firemen's Association; Local Chief, T. V. Elgin, President of the Association, is preparing for the event.

June 25-26—at Weedsport, N. Y. Northern New York Volunteer Firemen's Association.

July 3-4—at Northville, N. Y. Tri-County Firemen's Association. Dr. C. J. Robinson, M. E. Roberts are on the committee in charge.

July 22-24—at Cortland, N. Y. Central New York Volunteer Firemen's Association; James L. Murphy, President.

July 22-25—at Perry, Ia. Iowa State Firemen's Association; Chief Dan Flanigan, Perry, Ia., in charge.

July 24-25—at Bolivar, N. Y. Southwestern New York Volunteer Firemen's Association.

July 29-31—at Toledo, O. State Convention and Tournament of Firemen; H. Willhauck is Corresponding Secretary.

August 12-15—Wilmington, Del. State Firemen's Convention; J. D. McNeill, President.

September 1-6—at New York City. Fire Chiefs' Association 41st annual convention; Exhibits will be housed at Madison Square Garden; James McFall, Secretary, Roanoke, Va.

October 13-18—at Philadelphia, Pa. National Fire Prevention Conference; Powell Evans, Chairman, Room 420, City Hall, Philadelphia.

State Conventions and Fairs

June 16—at Camden, N. J. New Jersey State Association of Master Plumbers.

June 17-19—at Council Bluffs, Ia. Retail Merchants' Association.

June 23-25—at Beaumont, Tex. Retail Merchants' Association of Texas will hold 13th annual convention; W. J. Edgecomb, Secretary.

July 7-14—at Richmond, Va. Carolinas Retail Hardware Dealers' Association; T. W. Dixon, Secretary, Charlotte, N. C.

July 7-10—at Winnipeg, Manitoba. Canadian Forestry Association; James Lawson is chairman of committee in charge, and secretary of association; headquarters, Canadian Bldg., Ottawa.

July 8-9—at Stillwater, Okla. State Convention of Oklahoma Retail Dealers' Association.

July 8-10—at Fargo. North Dakota Retail Merchants' Association.

July 10—at Chattanooga, Tenn. National Electrical Contractors' Association.

July 15-17—at Clarksburg, W. Va. State Convention of West Virginia Funeral Directors' Association; J. A. McCabe, of Grafton, President.

July 16-19—at St. Catharines, Ont. Master House Painters' and Decorators' Association of Canada; Secretary, E. J. Livington, 288 Dundas St., Toronto, Can.

July 17-19—at Brownsville, Tex. South Texas Gardeners' Association of Truck Growers in Rio Grande Valley.

July 21-23—at Atlanta, Ga. Annual Convention of Retail Merchants' Association of Georgia; J. W. S. Hardy, President.

July 21-26—Grand Forks, N. D. North Dakota State Fair.

July 22-25—at Chillicothe, Mo. Livingston County Fair; A. M. Shelton is Secretary.

July 24-26—at Cedar Point, Ohio. Ohio Builders' Supply Association.

August—at Warren, Pa. Retail Merchants' Association of Pennsylvania; J. W. Kendall, Chairman.

August—at Galveston, Tex. Cotton Carnival, Galveston Commercial Association; F. M. Lege, Jr., Chairman.

August 1-30—at Empire City Park. Greater New York Fair and Exposition; John A. Murkin, Poultry, Heidelberg Bldg., Broadway and 42nd St., New York City, is Manager.

August 5-7—at Grand Rapids, Mich. Michigan Association of Rural Letter Carriers.

August 11-13—at Racine, Wis. Retail Grocers' and General Merchants' Association.

August 18—at Minneapolis, Minn. American Florists' and Ornamental Horticulturists' Society; J. K. M. L. Farquhar, of Boston, Mass., is President.

August 18-22—at Salem, N. H. Rockingham Park Fair.

August 19-22—at Cortland County, N. Y. Cortland County Fair; W. J. Greenman is Secretary.

August 26-29—at Norwich, N. Y. Chenango County Agricultural Society will hold annual fair.

August 26-29—at Ellensville, N. Y. Ulster County Agricultural Society will hold annual fair.

August 28-29—at Helena, Mont. Helena Flower Show Association; Dr. L. M. Rheem, Secretary of Commercial Club, is interested.

August 28-29—at New Hartford, N. Y. Central New York Horticultural Society will hold show.

September 1-5—at Chatham, N. Y. Columbia County Fair, under auspices of Columbia County Agricultural Society.

September 1-5—at Orangeburg, N. Y. Rockland County Fair, under auspices of Rockland County Agricultural and Horticultural Association.

September 3-13—at San Jose, Cal. Retail Grocers' Association Show; A. F. Emlay, Secretary

September 8-11—at Herkimer, N. Y. Herkimer County Agricultural Society will hold fair.

September 8-13—at Syracuse, N. Y. New York State Fair.

September 10-12—at Atlantic City, N. J. Annual Convention of Pennsylvania Millers' State Association to be held at St. Charles Hotel.

September 11-13—at Mankato, Minn. State Fair, under auspices of Mankato Fair Association; Charles T. Taylor is President.

September 16-18—at Gorham, Me. Cumberland County Agricultural and Horticultural Society will hold fair.

September 22-26—at New York City. Annual Convention of American Association of Master Bakers; Charles E. Abbott, 236 Eighth Ave., is Chairman.

September 23-26—at Rochester, N. H. Rochester Agricultural and Mechanical Association will hold fair.

September 24-27—at Mt. Kisco, N. Y. West Chester County Agricultural and Horticultural Society, Inc., will hold fair.

September 27-Oct. 3—at Sedlia, Mo. Missouri State Fair; John P. Stinson, Secretary of Fair Association.

October—at Tulsa, Okla. Convention of International Dry Farming Congress.

October 1-2—at Fredericksburg, Va. Rappahannock Valley Agricultural and Mechanical Fair Association will hold fair; A. P. Rowe, President.

October 4-11—at Denver, Colo. Electrical and Industrial Exposition by the Colorado Electrical Club; L. M. Cargo, 1052 Gas & Electric Bldg., is chairman of committee.

October 7-9—at Brenham, Tex. Washington County Fair Association will hold annual fair; C. A. DeWare is President, and F. H. Dever is Secretary.

October 7-10—at Greenwood, Ark. Greenwood Agricultural Show; Jesse A. Bell, Chairman of Finance Committee.

October 8-18—at Wichita, Kan. Third Annual Wichita Fair and Exposition to be held in the Forum; Walter P. Innes, Manager.

October 13-19—at Chicago, Ill. American Foundrymen's Association will hold convention at La Salle Hotel.

October 20-26—at Macon, Ga. Georgia State Fair; M. V. Calvin, Secretary.

October 21-24—at Wichita, Kans. Business Men's Association preparing for Trans-Mississippi Congress, to be held in Wichita.

December 9-12—at Harrisburg, Pa. Central Pennsylvania Poultry Association will hold exhibition; C. S. Smith, of West Fairview, is Show Superintendent.

December 10-12—at Milwaukee, Wis. Wisconsin Retail Implement and Vehicle Dealers' Association; G. F. Borchardt, South Milwaukee, Wis., President.

February 9-14—at Baltimore. Retail Hardware Association of Maryland, Pennsylvania, Delaware and New Jersey will hold convention; W. P. Lewis, Huntingdon, Pa., is Secretary.

MOTOR TRUCKS TO COMPETE WITH RAILROAD

The Motor Truck Club of Los Angeles, a "live" organization of owners, operators and manufacturers of commercial cars, is taking steps to secure a large part of the freighting between the city and the harbor of San Pedro, a little more than twenty miles from the wholesale section. For this reason it is planning to build a road devoted to motor trucks, with foundation and surface adapted to the use of heavy cars. A vitrified brick surface is regarded as the most satisfactory for that purpose. It is estimated that between $320,000 and $350,000 will cover the cost of such a highway.

In order to eliminate duplicate license fees for trucks operating in two or more towns, it is planned to unite with Motor Truck Clubs in other parts of California and work for a state tax on carriers of this description, doing away with the present local license system, which puts an undue burden of taxation upon the business.

New Incorporations

Admiral Motor Car Company, St. Louis, Mo., recently formed, will manufacture auto and buggy tops and auto trucks.

Alma Motor Truck Company has recently been formed at Alma, Mich., to take over the interests of the Alma Manufacturing Company, and market the Republic 1500 lb. commercial car.

Milwaukee Motor Company, Milwaukee, Wis., has increased its capital stock from $250,000 to $300,000, and August F. John has purchased the interest of E. Warner, formerly president and principal stockholder.

Killen-Walsh Manufacturing Company, Appleton, Wis., with an authorized capital of $100,000, is testing out a new farm tractor which utilizes a 40 h. p. gasoline engine, with a two speed transmission.

Personal Items

A. F. Mais has resigned as consulting engineer of the Studebaker Corporation, Detroit, Mich.

R. C. Chase has resigned from the Advertising Department of the Packard Motor Car Company.

Fred Robey has resigned the management of the Chicago branch of the International Motors Company.

Clyde Thompson has resigned the management of the Advertising Department of the Diamond Rubber Company.

Charles E. Chadwick, one of the organizers of the Brockway Motor Truck Company, Cortland, N. Y., has severed his connection with the company.

Glen W. Barder, previously with the Warren Motor Car Company, has been elected secretary and treasurer of the Kelly-Springfield Motor Truck Company, Springfield, Ohio.

E. W. Gould, formerly of Smithtown Branch, N. Y., has taken charge of the sales and advertising department of the Corbitt Automobile Company, Henderson, N. C.

Rollin W. Hutchinson, Jr., for two years advertising manager of the International Motor Company, of New York, has resigned. His future plans are not yet announced.

Ben W. Hammond, formerly manager of the Standard Motor Car Company's Oakland, Cal., branch, has been appointed Oakland manager of the Pacific Kissel Kar Branch.

R. K. Johnston, formerly with the Gramm Motor Truck Company, Lima, O., has been made factory manager for the Bowling Green Motor Car Company, Bowling Green, Ohio.

John U. Higinbotham, formerly assistant treasurer of the National Biscuit Company, has associated himself with the Detroit Lubricator Company, Detroit, Mich., in a similar capacity.

H. T. Boulden, formerly general sales manager of the Ohio Motor Car Company, Cincinnati, O., is now vice-president and general manager of the Service Recorder Company of Cleveland.

C. B. Warren, who recently resigned the position as manager of the Haynes Automobile Company, Kokomo, Ind., has become general manager of the General Motors Truck Company of New York.

Charles Fisher, formerly Chicago manager of the Universal Truck Company, has been promoted to district manager and will call upon middle western territory. He is succeeded by C. P. Derr.

Kentucky Wagon Manufacturing Company, Louisville, Ky. W. O. Harris, Jr., and Stuart E. Duncan have been elected directors, succeeding C. G. Strater and L. Allen. President W. C. Nones was re-elected, also the following directors: S. M. Nones, John Marshall, John C. Hughes, Bernard Bernheim, P. S. Tuley and James Glazebrook.

Jos. Q. Goudie, who has been manager of the Detroit Branch of the Diamond Rubber Company, has been appointed sales manager for the Penna. Rubber Company, of Jeannette, Pa. He will have his headquarters in Detroit.

George W. Edwards, well known in the St. Louis business world, has accepted a position of manager of the St. Louis branch of the General Motors Truck Company, with headquarters at 2815 Olive Street. This branch was formerly located ot 1115 Locust Street.

W. F. Wittenberg has become manager of the Nevada Manufacturing Company, Nevada, Ia., a company which is just starting the manufacture of motor trucks and motor plows. He comes from Milwaukee, where he has been connected as sales manager with the Christian Engineering Company.

Miscellaneous

Pierce-Arrow Motor Car Company, Buffalo, N. Y., is bringing out a two-ton truck which will be similar in general design to the company's five-ton model.

The Gramm-Bernstein Company, of Lima, O., manufacturers of B. A. Gramm's commercial cars has recently sent to Manila a shipment of its two-ton models.

Findeisen & Kropf Manufacturing Company, Chicago, Ill., have brought out a new model of the Rayfield carburetor, with which either kerosene or gasoline can be used.

Motor Truck Club of New York City, at its annual meeting on May 21st, discussed the question of facilities at the New York docks and steps were taken to influence the providing of better facilities for motor trucks than are now in use on old docks, in the new docks which are now under way.

Financial and Legal

Metal Body, Tank & Fender Company, Cleveland, O., bankrupt, has filed schedule showing liabilities of $10,018.13 and assets, $2,908.50.

Federal Chain & Manufacturing Company, Springfield, Mass., makers of non-skid chains for commercial and pleasure cars, has been petitioned into involuntary bankruptcy.

Motz Clincher Rubber Tires, made by the Motz Tire & Rubber Company, have been pronounced an infringement of patent No. 887,997, granted to Edw. B. Cadwell. The latter patent is one which is controlled by the Swinehart Clincher Tire & Rubber Company. The court granted a perpetual injunction restraining the Rapid Safety Filter Company of New York from using the Motz tires An appeal has been made from this decision.

Trade Changes and Factory News

Dayton Auto Truck Company, Dayton, O., it is rumored, is about to move its plant to Chattanooga, Tenn.

Lewis Spring & Axle Company, Jackson, Mich., has absorbed the Lee & Porter Manufacturing Company, Buchanan, Mich.

W. J. Hughey & Son Company, Chicago, Ill., are building a $100,000 factory for the manufacture of trucks at Prairie Ave. and Thirty-third St.

Moreland Distillate Motor Truck Company, 1701-31 N. Main Street, Los Angeles, Cal., is enlarging its plant at the cost of nearly $250,000.

Parish & Bingham Company, Cleveland, O., will erect a new building at W. 106th St. & Madison Avenue, Cleveland, O., 100 x 900 ft., one story high.

Thos. R. O'Brien, manufacturer of carts, motor truck bodies, etc., has established larger headquarters at Hubbard Avenue & Dale Street, Springfield, Mass.

The Rochester-Mais Commercial Car Company has been organized at Rochester, Ind., and will build a new factory for the manufacture of commercial cars.

Mogul Motor Truck Company, of Chicago, Ill., has leased a factory building at Maple Avenue and the Wabash Railroad, St. Louis, Mo., and will move its plant from Chicago, to St. Louis.

Fires

Mais Motor Truck Company, Indianapolis, Ind., suffered a $60,000 loss by fire. They were fully insured.

Lumen Bearing Company, Buffalo, N. Y., suffered a severe loss by fire, but were not seriously delayed in deliveries, and a new fireproof building is now being erected to take place of those destroyed.

THE ORDINARY REPAIR MAN

WHAT does the ordinary repair man in an automobile garage know about motor trucks? This is a question that you hear asked on all sides, but why?

In many instances the question is justifiable, in some, because the agent is not able or not willing to hire a competent man, and therefore has continual trouble in keeping the truck in running order, in others because men capable of tracing trouble to its source are not flooding the country; they are in great demand and are grabbed up by the wise manufacturers, branches and dealers, and sent out on the road to quiet the kickers.

When will this condition change? When will the ordinary repair man be competent to successfully handle truck repairs. The time is not so far distant as some may think, for many repair men are now endeavoring to get down to brass tacks. They are reading the journals devoted exclusively to commercial cars, noticing the cars upon the streets under different conditions and are noticing the effect upon them. They are studying carburetors and magnetos, both practically and from catalogues, and descriptions from month to month in the journals. They are discussing, not foolishly, but intelligently, the questions and difficulties as they arise.

Then, too, the dealers are demanding and the manufacturers are supplying more detailed information as to how different parts may be removed, or adjusted, in the shortest time. Men trained at the factories are being sent from place to place to instruct. The benefits of this are not fully realized by the great majority of agents, dealers, branch managers and repair men. Consequently this service man cannot impart to them as much knowledge as he should.

A concrete example of this comes to mind; the factory service man, a good genial fellow, who knew his business thoroughly, was at a branch where there had been considerable friction among the local men, and trouble with the cars.

The manager was somewhat of a know-it-all turn of mind, and on this particular occasion, when a trouble call came in ignored the services of the trouble man and said he would show them how to fix that in five minutes, and he should have. He went out with an ordinary mechanic about 9.30 a. m., and they heard nothing from him until 3.30 p. m., when he brought the truck in on the end of a tow line. When the service man then offered a suggestion he was given a short answer. Mr. Manager worked until late that evening, all the next day and part of the next, when the owner got so hot under the collar that Mr. Manager had to turn it over to the service man, who in a very short time located a double short circuit; one in the battery wires and one in the magneto wires. These were fixed in a few minutes, the carburetor adjusted and the truck ready to go back to work after being out of commission two days and a half, not because it was necessary, but for the want of the touch of the master hand.

Hebb, A. G. Auto Company, Lincoln, Neb., has taken the agency for the Chase truck.

C. B. B. Motor Company, Washington, D. C., has taken the agency for the Selden truck.

Holcomb Company, New Haven, Conn., has taken the agency for the Adams truck.

Reliance Automobile Company, San Francisco, Cal., has taken the agency for the Dart truck.

Gilardi & Faure, Sacramento, Cal., have taken the agency for the Kelly line of commercial cars.

Whitney Brothers Company, Santa Cruz, Cal., has taken the agency for the Velie and Alco trucks.

Mack Motor Truck Company will occupy garage being erected on Massachusetts Avenue, Cambridge, Mass.

Federal Truck Company, formerly located at 794 7th Avenue, New York City, has moved to 146 W. 52d Street.

Britton-Stevens Motor Corporation, Boston, Mass., has taken the agency for the Maccarr and Smith-Milwaukee trucks.

Wood-Van de Verg Auto Company, 432-34 W. Pico Street, Los Angeles, Cal., has taken the agency for the Krebs truck.

C. H. Harvey has been appointed sales manager for the Eastman Motor Car Company, 1726 Cherry Street, Philadelphia, Pa.

Rowe Motor Truck Company, of Coatesville, Pa., has opened the Rowe Motor Sales & Service Station, 647 N. 42d Street, Philadelphia.

Salt Lake Automobile Company, Salt Lake City, Utah, has established a truck service department, which will be in charge of a competent truck expert.

Universal Motor Truck Company, 183 Pleasant Street, Boston, Mass., has moved into temporary quarters at 175 Ipswich Street, owing to the widening of Pleasant Street.

Milwaukee Tire & Supply Company, Milwaukee, Wis., has been appointed local agent and distributor for White pleasure and commercial cars. The new Company will be known as the White Automobile Company, the Milwaukee Tire & Supply Company, owners.

R. W. Kerns, formerly general superintendent of the Brecht-Butcher Supply Company, St. Louis, Mo., has joined the sales force of the Missouri Motor Car Company, and is now in charge of the truck department.

R. E. Frye, well known to the building trade of St. Louis, having been identified with the Williams-Frye Sash & Door Manufacturing Company, is now general manager and an officer of the Lindsey Motor Car Company, St. Louis.

Motor Transportation Company, 1201-1213 W. Lake St., Chicago, Ill., has completed a new garage with 96,000 sq. ft. on one floor. This company makes a specialty of hauling by motor cars, and is probably the largest concern of its kind in America.

Stewart Motor Corporation, Buffalo, N. Y., has recently appointed the following dealers to handle Stewart delivery wagons; Charles L. Papworth, Lockport, N. Y.; Seacoast Garage Company, Asbury Park, N. J.; Edgewood Garage, Providence, R. I.; Van's Garage, Kingston, N. Y.; William Petry Garage, Hudson, N. Y.; Payne Automobile Company, Troy, N. Y.

THE WARNER MECHANICAL STARTER

This starter, which is being manufactured by the Warner Gear Company, of Muncie, Ind., under Gardner patents, is now being furnished as part of the Warner Company's transmission, as shown by the accompanying illustration.

This starter takes up very little room and is operated by simply pushing a release pedal. It consists of a special steel spring

Warner Mechanical Starter
Showing multiple-disc clutch with starter assembled. Black ring shows space taken up by starter

of tremendous strength, 42 ft. long, and 3 in. wide. The spring is securely wound within a large drum, which forms the inside driving spider of the large face multiple disc clutch. One end of the spring is hooked securely around the main drive gear, while the other is firmly held in place on the outer edge of the above mentioned drum.

This entire assembly is then enclosed within the fly wheel housing, thus making the actual space taken up by the starter, merely the space shown by the black spacer ring in the illustration.

The operation as to the releasing of the starter is controlled by the regular clutch pedal, which is worked between two small sub-levers controlled by the regular gear shift. There is absolutely no possibility of starter being released while gears are in mesh, due to an automatic locking device. The shift levers must be in neutral position before the spring can be unwound.

When the pedal is pushed forward as far as possible, the brake is applied, thus permitting the spring to be rewound by the momentum of the car, directly through the propeller shaft. This rewind operation takes but a second's time, the engine running entirely free all this time. The starter is an absolute high speed starter turning engine over 16 times at from 900 to 1,000 r. p. m. The actual weight of the starter complete is but 40 pounds.

THE SEATON WHEEL

The Seaton Wheel Company, of 211 Union Street, Nashville, Tenn., is calling attention to its product as an ideal equipment for commercial cars, fire apparatus, etc. The feature of this wheel lies in the design and location of the springs, so that no matter how the load is applied it is uniformly distributed over the entire number of springs at all times.

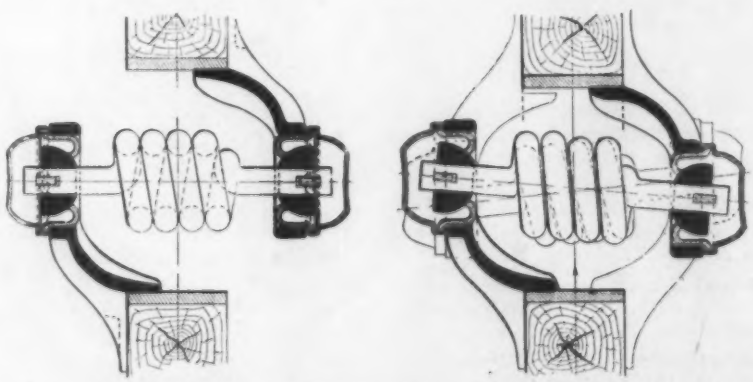
The wheel may be briefly described as a "wheel within a wheel." It consists of an outer and an inner rim connected by a series of tension springs. On the outer rim is mounted a solid rubber tire while the inner wheel consists of the usual arrangement of hub, spokes and felloes with thin steel tire.

The ends of each spring are fitted with hardened steel ball and socket joints which allow free movement in any direction and prevent cross strains, each joint being continually lubricated with hard oil packed about once a year under the close fitting, dust-proof, pressed steel cap. The segments, or supports for the springs are made of pressed steel of shape to give ample strength and rigidity.

The two sectional views show clearly the details of construction and operation of the springs, and examination of these

The Seaton Wheel

will make plain the fact that any motion of the inner wheel, either toward or from the outer wheel at any point, results in a slight elongation of the spring at that point; and since these two rims are both rigid, solid bodies, any movement which produces elongation of one spring results in an equal elongation of all the springs.



Sectional Views of the Seaton Wheel, Showing Action of the Springs

ST. LOUIS TIRES MADE TO MEET ALL CONDITIONS

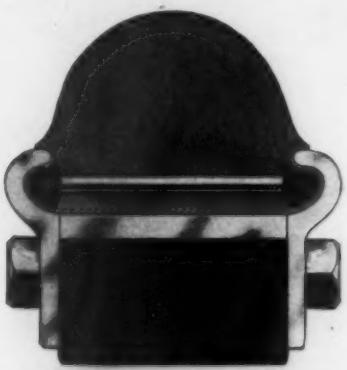
The St. Louis Tire & Rubber Company, of St. Louis, Mo., manufactures a line of tires designed for commercial car use, which meet all requirements from the small delivery wagon to the heaviest truck.

For light delivery wagons the Notch Electric Tire is offered. The notches

Detail View of the St. Louis Notch Electric Tire for Light Delivery Wagons

serve to make the tire very resilient and at the same time provide an anti-skid feature. The notches are moulded at an angle of 20 degrees, and compress and expand at every inequality of the road.

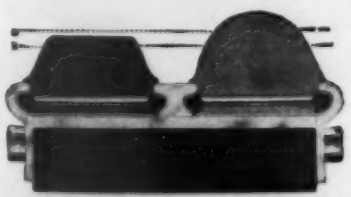
The Notch Truck Tire is similar in construction to the electric tire with the exception that a different composition is



The St. Louis Solid Truck Tire

used, thus making it more suitable for use on heavy trucks.

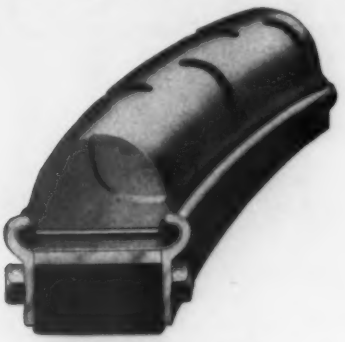
The Dual High and Low Tire. The particular feature of this tire is to provide means for overcoming vibration due to running empty. It is conceded by engineers that it is more harmful for a truck to travel at high speed over rough pavements when empty than when loaded. This tire solves this problem by



The Dual High and Low Tire

providing a high, soft, resilient tire to carry the empty truck, but which compresses to the height of the hard low tire when the truck is loaded. It provides for both extremes of loading, and allows the operator to take advantage of the empty truck without injury by undue vibration.

The Solid Truck Tire is made in both dual and single forms, and is, of course,



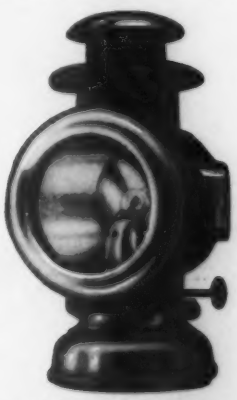
The Notch Truck Tire

designed for use on loads where the load is uniform.

The Hydro Notch Tread is a pneumatic tire built upon a new principle, in which the tire is expanded against the mold. The tire is built by hand on a form then placed on a mold and hydraulic pressure applied from the inside. In this way each layer of fabric is stretched to the same extent, for when the pressure is applied in the vulcanizing process, the ends of any layer that is stretched tighter than any other layer will slide until it is stretched equally tight. This tire is made with either plain or non-skid tread.

NEW GRAY & DAVIS TRUCK LAMPS

These lamps have been placed on the market by Gray & Davis, 55 Lansdowne Street, Boston, Mass., to meet the requirements of truck service. Either lamp can be had for oil or combination oil and elec-

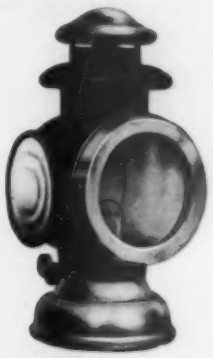


Gray & Davis Side Lamp, No. 99

tric. The regular finish is black enamel with nickel trimmings. For other finishes 10 per cent. additional is charged.

The side lamp is 9¼ in. high, 5 in. deep and 4⅝ in. diameter of flange. The price with oil alone is $5, and with electric attachment $6.50.

The tail lamp is 9½ in. high, 5⅛ in. deep, and 4¼ in. wide. The price, oil alone, is $3.50, and with electric attachment $5.



Gray & Davis Tail Lamp, No. 115

To those who desire an electric tail lamp built for hard service, this concern is offering its type D-4 lamp, which is regular-

Gray & Davis Electric Tail Lamp

ly furnished with 6-volt, 2 C. P. bulb, and large red lens, with side glass for lighting up the license tag. This lamp is 3¾ in. in diameter, 3⅜ in. long and 4 in. high. It is fitted with double props and lists at $4.

Two New Truck Horns

These horns are designed especially for use on commercial cars, and have recently been placed on the market by the Automobile Supply Manufacturing Company, 220-24 Taaffe Place, Brooklyn, N. Y. They are catalogued as No. 99, and have 6½ in. oval bells. The tone is very rich and penetrating. Either black enamel or brass finish can be had. Any style of bracket can be furnished, so that the horns can be placed either on the left or right side of the car, or under the seat.

DIVINE INDESTRUCTIBLE TRUCK TIRE

The Divine Tire Company, Utica, N. Y., has recently been incorporated with a capital of $225,000, organized for the purpose of manufacturing an automobile tire, invented and patented by B. H. Divine.

The Divine Indestructible Tire

The tire is composed entirely of strips of canvas, cut diagonally, or on the bias, and placed in a circle, crosswise the face of the tire and compressed into a mass of fabric, bound with a steel rim around the inside of the tire. The canvas is cut, so that the ends of the fibre form the tread of the tire and not the flat side of the fabric. These tires are claimed to be durable, possess nonskid qualities and after the fabric is compressed into the rim to be an indestructible substance, which cannot be cut with glass or stones.

THE WASSON PISTON RING

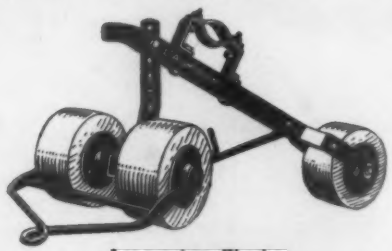
The feature of this ring, manufactured by the Wasson Piston Ring Company, 1121-23 Clinton Street, Hoboken, N. J., is that it is made concentric, that is, the thickness of the ring is made uniform all around. The ring is treated in an automatic machine, which expands the inner surface of the ring in such a manner that the outward radial pressure is the same at all points. The claims of superiority made are that the Wasson ring fits the ring groove very closely, prevents oil from accumulating in back of the ring, also allows only as much oil to reach the top of the piston as is necessary for lubrication.

The C. D. F. Patent Adjustable Bearing on Connecting Rod

The illustration shows a connecting rod fitted with the C. D. F. Patent Adjustable Bearing, which contains only five parts and requires no shims for adjustment. This bearing is also made for crank shafts. It is manufactured by the Chicago Drop Forge & Foundry Company, 447-517 Kensington Avenue, Chicago.

THE LAWSON AUTO WRECKER TRUCK

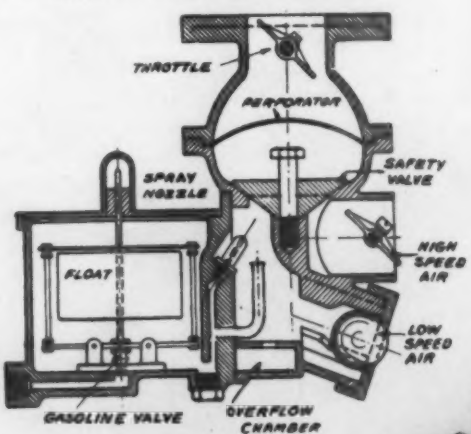
This device is designed for bringing in commercial cars with broken wheels or axles. It is designed principally for repair shop and garage use. It will take care of the heaviest machines and can be adjusted to any size. It weighs about 90 lbs. and is constructed of steel throughout except the wheels, which are made of maple-wood and are 4½ in. face, 10 in. in diameter. The backbone of the device carries a clamp which secures the disabled vehicle to it. The clamp is raised to go over the rod of the rear axle. When the rear wheel or axle is broken the handle is doubled under the truck and locked, while, if used at the front, the handle is roped to the wagon or auto drawing the disabled machine and the device will turn with the truck. The device lists at $15 and is manufactured by the Menasha Wood Split Pulley Company, Menasha, Wis.



Lawson Auto Wrecker

THE SUNDERMAN SAFETY CARBURETOR

The main feature of this carburetor lies in the fact that it is claimed to be absolutely proof against back firing and that at all speeds the correct proportion of air and fuel is fed to the motor. The back firing of this carburetor is taken care of by the safety valve (see sectional view). This valve lifts under ordinary conditions but as soon as a back fire takes place it is forced tightly against the seat, preventing any flame from shooting into the carburetor. The low speed air is taken care of by a ball valve, while for high speed an auxiliary air valve of the butterfly type operates in unison with the throttle valve. For easy starting a dashboard attachment is provided, which is so arranged that by pulling out on the lever it will give the engine more gasoline without changing any adjustment. This carburetor is manufactured by the Sunderman Safety Carburetor Corporation, 117 Broadway, Newburgh, N. Y. It is made in 1, 1¼, 1½ and 2 in. sizes, die castings listing at $20, $25, $30 and $38. A 2½ and 3 in. size, sand castings, list at $80 and $100.



Sectional View of the Sunderman Safety Carburetor

THE "A C" PRIMING PLUG

One of the main claims set forth for the design of this plug is that it is absolutely gas-tight. The valve is placed in such a manner that the compression has a tendency to keep it shut tight. Tests have shown that even with the thumb nut loose, the effect of the compression was sufficient to keep it gas-tight. This plug is manufactured by the Champion Ignition Company, of Flint, Mich., and lists at $1.

The "A C" Priming Plug

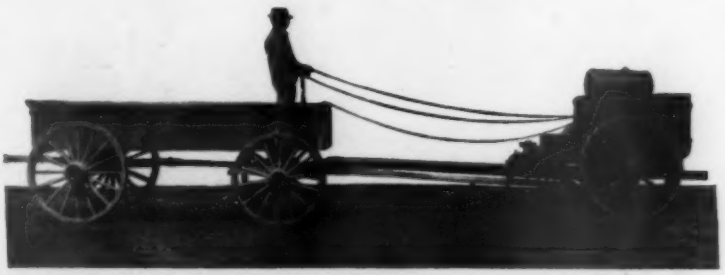
The Sunderman Safety Carburetor

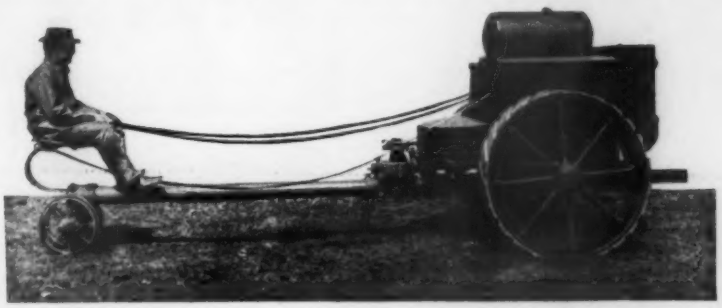
THE DETROIT TRACTOR

The most peculiar feature of the Detroit Tractor, which is apparent from the illustration, is the control by means of reins instead of the usual wheel. An advantage claimed is that it is very simple, and the operation is similar to that of driving a horse. Three reins are all that are necessary, two for steering and one for shifting the gears from neutral to forward or back. In hilly country a fourth rein is added to operate the brake.

This tractor is fitted with a belt, and when not used for pulling the plow, mower, seeder, wagon, etc., can be used as a stationary power plant for running the corn sheller, wood saw, husker, and other farming apparatus. This tractor is also recommended for use in lumber yards, as it can be changed from an empty to a loaded wagon without delay.

The power plant consists of a Continental four-cylinder motor, the power being transmitted by two spur gear reductions from the crank shaft to the driving wheels. Lubrication is by Detroit force feed oiler, two separate systems being required—one for oiling the engine and gears which operate the drive shaft and power pully, and the other for oiling the bearings and gears when the tractor is in motion. Ignition is by Bosch high tension magneto. The cooling is taken care of by a vertical fin tube radiator. The carburetor will work on gasoline, kerosene, distillate, and other low grade fuels, gasoline however, being used for starting. The fuel tank holds 30 gal. This tractor lists at $2200; extension rims $50 extra. It is manufactured by the Detroit Tractor Company, 807 Scotten Avenue, Detroit, Mich.





The Detroit Tractor in Use

The upper illustration shows how the Detroit Tractor may be employed for the purpose of hauling a wagon, mower, seeder, grain binder, etc. In every instance the rein control is used. The steering is accomplished by a pull on either the right or the left steering rein, which connects the engine by a special friction clutch to the steering gear and the tractor is turned by the engine's power. A very slight pull is all that is necessary to make a complete turn. A pull on both reins simultaneously, stops the tractor instantly. The third rein is used only to shift the gears from neutral to forward or back.

LARGE WHITE INSTALLATION

The sale of sixteen White delivery trucks to the New York department store of Gimbel Brothers was recently announced by the White Company, of Cleveland, O.

The sixteen trucks purchased by Gimbel Brothers, in conjunction with a fleet of twenty-six Whites which have been in the service of the company for a year and a half, gives this department store one of the largest fleets of standardized gasoline delivery trucks.

This increased installation is equally important from the standpoint of delivery efficiency, inasmuch as all of the forty-two trucks are exactly alike, enabling the firm to take the utmost advantage of uniform design, as well as the accompanying simplicity of operation, garaging and maintenance.

KELLY TRUCK SAVES $50 A WEEK

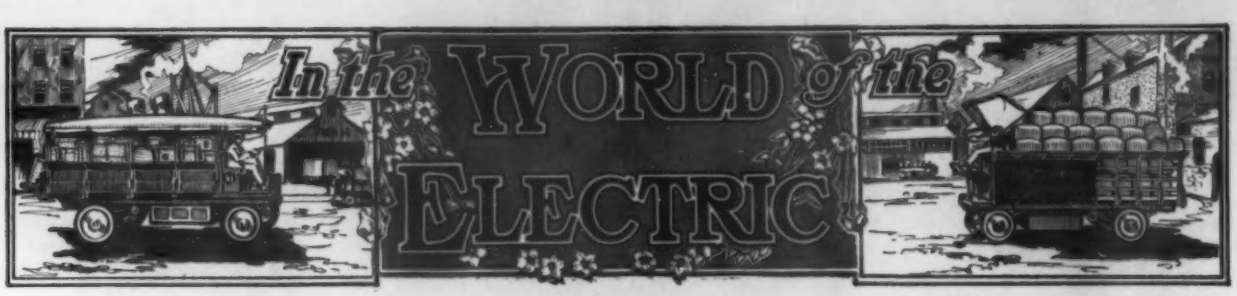
A one-ton Kelly truck is saving $50 a week for the Rome (Georgia) Coca Cola Bottling Company, according to F. S. Birem, the manager of the company.

This saving is made in livery and hotel bills. Before the purchase of the truck some of the hauls by wagon took two days, and it was necessary to pay hotel and livery bills two or three nights a week for two teams and two drivers. The truck makes these hauls in less than a day, and a big saving results.

Mr. Birem adds that this truck averages from 75 to 100 miles a day for six days a week.

Autocar Estate Car

The seats in rear half of body removable for baggage, leaving seats in front half intact for passenger service; full seating capacity of car, fourteen passengers, including the driver. Built by the Autocar Company, Ardmore, Pa.



Cost of Upkeep of Horse-Drawn Vehicles Against Electric Vehicles

*Extract from paper read by W. R. Mets, superintendent of the Government Printing Office, at Washington, before the American Society of Mechanical Engineers, at Baltimore, on May 21st, 1913. It should be borne in mind that in the cost figures that Mr. Mets gives, no account is taken of electricity, as the government makes its own, and neither is any account taken of garaging, consequently no storage charges appear. Mr. Mets has made a close study of commercial cars, and is probably the best informed of the government officials, unless it be Major Halloran, of the Walter Reed Hospital.

A GREAT deal has been written on the subject of motor trucks *versus* horse-drawn vehicles, but it appears to be extremely difficult to obtain exact figures, as most firms regard the item of hauling as an overhead expense not worthy of the minute examination given to the other departments.

The motor-driven vehicle is unquestionably cheaper to operate than is the horse-drawn vehicle where a number of vehicles are used, and, in the opinion of the writer, the only question to be determined is the advisability of using electric or gasoline-driven machines. From figures on hand, it appears that the cost of upkeep of the gasoline driven machines is about double per mile that of the electric-driven machines (not including driver's or helper's wages), but, on the other hand, the gasoline-driven machines have a much larger radius of operation, and, in certain cases, this would more than offset the cheaper upkeep expense of the electric-driven machine.

As a general proposition, it appears that the electric-driven machine is better for city service where the streets are in fairly good condition, and that the gasoline-driven machine is better for long hauls over rough roads and in the open country, mainly on account of the ability to obtain gasoline and water, and the chances of making greater speed.

During the Fall of 1910 the writer and the accountant of our office were instructed to submit a report as to the desirability of purchasing motor trucks to replace horse drawn wagons, and an investigation was made covering certain government departments and private firms. This report was submitted in November, 1910, and it was estimated that the office would save approximately $11,000 per annum if electric vehicles were purchased and all of the horse drawn equipment sold.

This report was approved and equipment purchased as outlined herein, and the results were most gratifying, as the saving during the first year was nearly $12,000, in spite of the fact that, during this year, only a part of the electric truck equipment was purchased and six horses were kept. Five of these horses have since been sold, and the saving during the next year will undoubtedly be increased.

Preliminary Investigation

The naval gun factory at Washington operated five electric trucks, two of which had been in operation for four years; one of these had a capacity of 2500 lbs., and the other a capacity of 5 tons. The first was furnished by the McCrea Motor Company, of Ohio, and the other by the Studebaker Company. The cost of operation and the saving accomplished were as given in Table 1.

Table 1—2500 lb. Electric Truck

Cost of Truck	$2230.00	
Labor for charging batteries		$46.44
Charging		16.50
Acid		18.00
Rubber jars		15.00
Batteries (partly renewed)		64.98
Carbon brushes		1.80
Repairs		99.96
1 Operator at $2.48 per day		776.24
2 Laborers at $1.92 per day each		1201.92
Totals	$2230.00	$2240.84
Depreciation 10 per cent.		223.00
Interest on investment at 2 per cent.		44.60
Total cost		$2508.44
Total mileage per year	3366	
Cost per mile	$0.745	

This truck displaced 5 horses and carts, costing as follows:

5 Carts by contract at $1.92 per day	$3004.80
5 Laborers at $1.92 per day each	3004.80
Total	$6009.60
Net saving of truck over horses per year =	$3501.16

Five-Ton Electric Truck

The cost of operating this truck was about the same as the 2500-lb. wagon, excepting that the 2500-lb. wagon cost 75 cents for charging per 40 mile radius while the 5-ton truck cost was $1.10 for the same radius. The total cost of operation is given as $2396.84, and if depreciation and interest on the investment of $3725 are included the total cost will be $2843.84.

This truck displaced two 2-horse wagons costing as follows:

3 Laborers, each wagon, at $1.92 per day	$3605.76
Stabling, shoeing, etc., 4 horses at $4 per day	1252.00
Total	$4857.76
Net saving of truck over horses	$2460.92

In this case depreciation and interest are not included as the original cost of the horses was not known.

One large company operates a number of horse-drawn wagons, also a number of motor trucks, both electric and gasoline-driven. Their experience is given in Table 2.

Table 2—Horse-Drawn Vehicles

Investment:		
1 Horse	$250.00	
1 Vehicle	125.00	
Harness	30.00	
Total		$405.00
MAINTENANCE AND UPKEEP.		
Depreciation:		
Horse at 20 per cent.	$50.00	
Vehicle at 15 per cent.	18.75	
Harness at 15 per cent.	4.50	
Interest on $405 at 6 per cent.	24.30	
Total		$97.55
Horse Upkeep:		
Feed at 47.4 cents x 365 days	$173.01	
Shoeing at 7.5 cents x 365 days	27.38	
Veterinary at 1.1 cents x 365 days	4.02	
Total		$204.41
Vehicle expense at 43.4 cents per day	$158.35	
Harness Expense	4.50	
Total		$162.85
Total expense exclusive of labor and stable		$464.81

From Table 2 can be estimated the yearly expense of vehicles requiring more than one horse, by adding the items for horses and harness to the one horse vehicle costs as follows:

1 Horse vehicle expense	$464.81
Vehicle and 2 horses expense $464.81 plus $275.71	740.52
Vehicle and 3 horses expense $740.52 plus $275.71	1016.23
Vehicle and 4 horses expense $1016.23 plus $275.71	1091.94

These costs do not include labor and stable expense.

In Table 3 are given the costs of operation for the electric trucks used by this same company. Table 4 compares the operation costs of the first two trucks recorded

in Table 3 on the basis of 300 days' service per year. Table 5 makes a similar comparison of the commercial and individual gasoline machines assuming 300 days' service per year for the former and 365 days for the latter. The following makes of gasoline cars were in use: Cadillac, Brush, Buick, Ford, Franklin and Maxwell, ranging from 10 h. p. to 30 h. p.

ing six horses, one five-ton capacity, two-horse truck, one single-horse truck, one carriage driven by two horses, and one carriage driven by one horse.

Vehicles in Use by Our Office

During the fiscal year 1910 and 1911, which were the last two years that horse drawn vehicles were used exclusively, the

Table 3 - Expense of Operating Electric Commercial Vehicles

Capacity, Lb.	850-1000	1500-2000	2500-3000	4000	7000
Interest and Depreciation (Machine less Batteries and Tires)	$244.50	$306.30	$391.40	$422.94	$470.84
Mechanical and Electrical Upkeep	67.54	84.15	101.70	110.96	121.42
Tire Repairs and Renewals	79.28	97.30	155.05	267.60	535.25
Battery Repairs, Cleaning and Renewals	130.50	175.36	219.34	271.54	312.84
Current at 1 cent per kwhr.	20.00	30.20	40.00	60.00	51.50
Totals	$541.82	$693.31	$907.49	$1133.04	$1491.85

In addition to the records obtained from this company, the attempt was made to secure data from a number of private firms, but unfortunately none of them had any exact figures and could only approximate the savings due to the use of both electric

Table 4—Total Mileage of the First Two Cars, and the Cost Per Mile of Each, Exclusive of Interest and Depreciation

Capacity, Lb.	Miles per Day	Miles per Year	Cost per Year	Cost per Mile
850 to 1000	25	7500	$297.32	$0.04
1500 to 2000	25	9125	277.01	0.03

and gasoline-driven trucks over horse-drawn vehicles.

From Table 7 can readily be obtained the operating cost of one two-horse, 5000-lb.

Table 5—Cost and Mileage of Commercial and Individual Machines

Service	Miles per day	Miles per Year	Cost per Year	Cost per Mile
Commercial	22.2	6660	$896.69	$0.135
Individual	19.7	7190	809.53	0.1125

Table 6—Comparative Expense of Operating Motor Vehicles in Place of Horse-Drawn Vehicles

Vehicles for Emergency Work:		
Two 2-horse vehicles at $740.52	$1481.04	
One 3-horse vehicle at $1016.23	1016.23	
		$2497.27
One 4000-lb. automobile	$1133.54	
One 2500-lb. automobile	907.49	
		$2040.53
Annual Saving by use of Automobile, not including Labor		$456.74
Supply Wagon:		
One 4-mule wagon	$1291.94	
One 4000-lb. automobile	1133.04	
Annual Saving		$158.90
Paymaster's Money Wagon:		
One 2-horse vehicle	$740.52	
One 850 to 1000-lb. vehicle	541.82	
Annual Saving		$198.70

capacity wagon, and these are given in Table 8. During the month of November, 1911, there were purchased and put into service two 1000-lb. trucks, two 2000-lb. trucks, and two 5000-lb. trucks, all of the electric type, and at the same time 17 horses and their equipment were sold, leav-

total expenses for the stable were $31,113.58 for 1910, and $31,231.93 for 1911; and for the same years the cost of the delivery section was $17,093.93 for 1910, and $17,256.19 for 1911, making a total cost for the delivery and stable sections of $48,207.51 for 1910, and $48,488.12 for 1911. It should be stated here that the stable and delivery sections were entirely separate at this time, each being in charge of a foreman, whereas after the automobiles were used these sections were combined, al-

Table 7—Equipment, Number and Class of Men Employed, and Cost of Operation, Maintenance and Repair for Horse-Drawn Vehicles for Year Ending June 30, 1910

Equipment:	Cost.
23 Horses (average per year)	$6900.00
Harness, blankets, etc.	1350.00
1 Five-ton truck (2 horse)	425.00
7 Large delivery wagons (2 horse at $475.00 average)	3325.00
6 Single delivery wagons (1 horse at $275.00 average)	1650.00
3 Light mail wagons at $200	600.00
4 Depot wagons (carriages) at $300	1200.00
2 Coupes, with pole and shafts, at $540	1080.00
Total	$16,530.00

Number and Class of Men Employed

Stable Section

1 Foreman at $2000 per year
1 Mail carrier at $3.20 per day
1 Messenger at $2.40 per day
11 Drivers at $2.40 per day
1 Stableman in charge at $2.88 per day
8 Stablemen at $2.40 per day

Delivery Section

1 Foreman at $2000 per year
4 Helpers at $3.04, 2.80, 2.72 and 2.40 per day
12 Messengers at $2.40 per day
2 Unskilled laborers at $2.00 per day

Total employees* in both sections = 42.

Cost of Operation of Stable Section:	
Wages of foreman and stablemen	$10,113.59
Wages of drivers	12,666.21
Rent	2,400.00
Feed	3,172.20
Supplies	959.62
Repairs to harness, wagons, etc.	626.86
Shoeing	906.60
Gas and electricity	268.50
Total cost of operation, maintenance and repair	$31,113.58
Depreciation: Horses 20 per cent., harness 15 per cent., wagons 10 per cent.	2,410.50
Interest on investment at 2 per cent.	330.60
Total cost, including depreciation and interest on investment	$33,854.68
Cost of Operating Delivery Section:	
Salaries and wages	$17,085.93
Material and supplies	8.00
Total cost	$17,093.93

* 20 per cent. additional is allowed for night service.

Table 8—Cost Per Year of One Two-Horse 5000-lb. Capacity Wagon

Wagon Expense—			
Cost of truck	$425.00		
Cost of maintenance and repair		$31.75	
Cleaning and washing		66.76	
Lubricants		1.00	
Depreciation, estimated at 10%		42.50	
Total			$142.01
Horse Expense—			
Cost of two horses	$615.00		
Cost of feed		$264.53	
Cost of care (hostler)		702.60	
Cost of veterinary and office labor		250.10	
Cost of medicine		2.17	
Cost of shoeing		78.84	
Cost of blankets, nets, etc.	12.22		
Rental value of space (2 horses) based on $2400 for 22 horses		218.00	
Depreciation, estimated at 20%		125.44	
Total			$1641.48
Harness Expense—			
Cost of harness	$123.00		
Cost of maintenance		7.68	
Depreciation, estimated at 15%		18.45	
Total			$26.13
Miscellaneous Supplies		$10.00	
Drivers' wages		751.20	
Helpers' wages		751.20	
Gas and Electricity		23.34	
Interest on investment at 2%		23.50	
Total			$1559.24
Total Original Cost	$1175.22		
Total expense for one year			$3368.86

though the costs were separated. The equipment, number of men employed, and the expenses of the stable and delivery sections during the fiscal year 1910 are given in Table 7. Omitting the wages paid the drivers and messengers, the stable section alone cost $18,477.37, making the cost per horse per year $802.06, or $2.20 per day, of which 37¾ cents was for feed.

In November, 1912, one additional 5000-lb. truck and an electric-driven carriage were installed, and two carriage horses and one truck horse and their equipment were sold.

In January, 1913, one 8000-lb. capacity truck was installed, and two more truck horses and their equipment sold.

The truck equipment, and the number

Table 9—Equipment and Number and Class of Men Now Employed

Equipment—		
Two 1000-lb. trucks	$4,639.00	
Two 2000-lb. trucks	5,498.78	
Three 5000-lb. trucks (two in use during full year)	10,625.22	
One 8000-lb. truck (installed in January, 1913)	5,509.00	
One electric-driven carriage (installed in November)	3,671.00	
Total Cost		$29,943.00
Number and Class of Men Employed—		
1 Foreman at $2000 per year	$2,000.00	
12 Chauffeurs at $2.40 per day each	9,024.40	
3 Helpers at $3.20, $2.80 and $2.72 per day	2,729.36	
10 Messengers at $2.80 (two) and $2.40 (eight) per day	7,762.40	
1 Mail carrier at $3.20 per day	1,001.60	
2 Messenger boys, at $1.20 each per day	751.20	
1 Stableman in charge at $4.00 per day	1,252.00	
3 Stablemen at $2.40 each per day	2,253.60	
2 Drivers at $2.40 each per day	1,502.40	
35		$28,276.96

Note—Labor charge is based on day service.

and class of men employed for caring for the electric vehicles and the remaining horses during the year 1912 is given in Table 9.

During the coming year, and after the remaining six horses are sold, the four stablemen will be dispensed with and in their place there will be employed probably two helpers and one laborer, at a total cost of $6.80 per day, or $2128.40, thus indicating a further reduction of $1377.20.

All of the electric trucks were purchased from the Baker Motor Vehicle Company, of Cleveland, O., and the Iron-clad Exide storage batteries from the Electric Storage Battery Company, of Philadelphia, Pa.

It will be noted that there have been no tire costs during the year. This, of course, was due to the fact that none of the tires have worn out, but it should be stated that tires on the 5000-lb. trucks are practically worn out, and in fact, were being replaced during the month of January, 1913, so that the tires on these trucks wore out after running since December, 1911, or a period of 13 months. The tires on the 1000 and 2000-lb. trucks are still in fairly good condition. The tires on the 5000-lb. truck would undoubtedly have lasted longer than they did were it not for the fact that these trucks were often loaded up to 7000 lbs., making a considerably harder service than could have been anticipated by the makers. The total cost of operating the combined delivery, stable and garage during the year 1912 was given in Table 10.

In Table 10 it is interesting to note that the six electric trucks, doing practically all of the work, cost only about twice as much as the six horses. As a matter of fact, the six electric trucks alone did as much work as the total stable force did during the year previous, and the horse-drawn equipment simply took care of the increased work.

Table 11 shows in detail the cost of taking care of the electric trucks, and as the cost of the trucks of any given size is

Table 10—Salaries, Wages, Leave of Absence, Holiday and Liability Payments, Material and Supplies, Repairs, Etc., for Delivery, Stable and Garage, January 1, 1912, to December 31, 1912

	Salaries, Wages, Leave of Absence, Holiday and Liability Payments.			Material and Supplies, Repairs, etc.		
Month	Delivery	Stables	Garage	Delivery	Stables	Garage
January	$1,429.23	$523.71	$818.23	$14.75	$149.85	$223.87
February	1,330.59	465.88	822.56	2.74	127.06	224.89
March	1,345.76	487.61	828.97	2.28	189.36	240.67
April	1,245.10	484.17	891.61	13.51	76.21	197.08
May	1,378.52	543.23	1,019.64	25.55	114.27	183.87
June	1,141.73	453.61	821.78	66.96	213.18	495.99
July	1,454.96	512.77	887.06	9.40	124.35	173.57
August	1,372.38	447.99	889.27	6.00	127.84	251.64
September	1,487.09	429.50	678.68	4.34	122.53	198.60
October	1,391.65	443.33	710.59	9.94	129.54	307.26
November	1,565.02	337.95	809.68	1.35	57.76	222.40
December	1,460.70	252.00	910.13	13.95	48.81	203.41
Total	$16,602.73	$5381.75	$10,088.20	$170.77	$1480.78	$2923.25
Equipment issued January 1 to December 31, 1912				$70.00		$24,446.00

Table 11—Electric Vehicle Record

	1000-LB.			2000-LB.			5000-LB.		
	Jan.-June	July-Dec.	Total	Jan.-June	July-Dec.	Total	Jan.-June	July-Dec.	Total
Total Miles	3013.00	3511.00	6524.00	2978.00	2864.00	5842.00	3586.00	2918.00	6504.00
Ampere Hours	8598.00	17057.00	11019.00	9710.00	20929.00	18,302.00	14096.00	32398.00	
Ampere Hours per Mile	2.85	2.40	2.61	3.69	3.39	3.58	5.10	4.83	4.98
Kw-Hr. Supplied	1249.8	1303.80	2553.6	1573.6	1389.4	2963.00	2678.4	2047.8	4726.2
Cost of Current	$14.67	$16.64	$31.31	$18.58	$17.79	$36.37	$31.56	$26.28	$57.84
Battery Upkeep	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tire Upkeep	.....	.....	.....	.....	.....	.....	.....	.....	.....
Electrical Upkeep	1.20	2.93	4.13	0.75	14.38	15.13	5.06	8.67	13.73
Mechanical Upkeep	26.80	27.68	54.48	41.34	28.41	69.75	129.62	80.10	209.72
Inspection	161.58	138.67	300.25	161.58	138.67	300.25	161.58	138.66	300.24
Totals	$204.25	$185.92	$390.17	$222.25	$199.25	$421.50	$327.82	$253.71	$581.53

Table 12—Cost of Operating One 5000-lb. Electric Truck

Cost of Truck and Equipment (including spare battery and parts)	$3745.00	
Maintenance and repair (as per statement above)		$581.53
Depreciation at 10%		374.50
Interest on investment at 2%		74.90
Chauffeur's wages at $2.40 per day		751.20
Messenger's wages at $2.40 per day		751.20
Total Original Cost	$3745.00	
Total Expense for one year		$2533.33

Table 13—Costs of Electric Trucks and Two-Horse Wagon

	2-Horse Wagon 5000-lb. Capacity	5000-lb. Electric Truck	2000-lb. Electric Truck	1000-lb. Electric Truck
Average Trips per Day	4	8	8	9
Mileage per day, Average	12	24	20	20
Mileage per Month (Loaded Half-way)	312	624	520	520
Average Load per Trip, lbs.	4,000	5,500	2,500	900
Total Load per Day, lbs.	16,000	44,000	20,000	8100
Tons	8	22	10	4.05
Total Load per Month, Tons of 2000-lbs.	208	572	260	105.3
Total Cost per Month	$280.74	$211.11	$187.81	$180.93
Cost per Mile	0.899	0.338	0.361	0.347
Cost per Mile (Omitting Driver's and Helper's Wages)	0.499	0.138	0.121	0.107

One of these electric trucks easily replaces two 2-horse trucks.

GOVERNMENT PRINTING OFFICE

OFFICE SUPT. OF BUILDINGS

ELECTRICAL VEHICLE RECORD MACHINE NO.....

MONTH	JAN.	FEB.	MAR.	APR.	MAY	JUNE
TOTAL MILES						
AMP. HRS. USED						
AMP. HRS. PER MILE						
K. W. HRS. SUPPLIED						
COST OF CURRENT						
BATTERY UPKEEP						
TIRE UPKEEP						
ELECTRICAL UPKEEP						
MECHANICAL UPKEEP						
INSPECTION						
TOTALS						

REMARKS.....

about the same, only one of each size is given.

From the given figures we can readily ascertain the cost of operating one 5000-lb. capacity electric truck compared with one 5000-lb. capacity two-horse wagon.

The cost of two two-horse wagons being $6737.72 (Table 7), the saving due to the use of the electric truck is $4204.39.

GOVERNMENT PRINTING OFFICE

ELECTRICAL SECTION

DAILY CHARGING RECORD—ELECTRIC VEHICLES

Battery No..... *Date*..... 191

TIME	VOLTS	AMP.	SP.GR.	TEMP.

FORM S—447

(*Signed*).....

Unfortunately, no mileage record of the horse-drawn vehicles was kept during the previous years, but the records show that the two-horse wagon made an average of four trips per day, and the present records show that the 5000-lb. electric trucks make an average of eight trips per day. The mileage of the electric trucks being about 24 per day, it may be assumed that the mileage of the horse-drawn trucks was about 12 per day.

For the sake of comparison, the costs of the three sizes of electric trucks and of the two-horse wagon are given in Table 13. The average load on the 5000-lb. electric truck is 5500 lbs., that on the 2000-lb. truck is 2500 lbs., that on the 1000-lb. truck is 900 lbs., and that on the two-horse wagon was 4000 lbs.

The methods of keeping the records are given as a matter of interest. The Daily Meter Record and the Daily Charging Record are made out, one for each truck, by the employees in the garage. These are turned in to the office each morning and transferred to the Electrical Vehicle Record each month. This card is printed on both sides, thus providing space for a whole year.

The electrical and mechanical upkeep are obtained from the regular mechanics' work slips. Every machine in the office is given a number, and all repairs made and materials used are entered on the work slip and charged against the machine number and tabulated in the office. In this way an accurate record is kept as to the cost of each machine.

Under inspection is charged the time for charging batteries, washing the trucks and similar miscellaneous work in the garage, and all of this cost is evenly distributed among all of the trucks in service.

GOVERNMENT PRINTING OFFICE

ELECTRICAL SECTION

DAILY METER RECORD—ELECTRICAL VEHICLE

Machine No..... *Battery No*..... *Date*..... 191

	READING OF ODOMETER	READING OF AMP. HR. METER	TIME	REMARKS
IN				
OUT				
DIFFERENCE				

FORM S—450

(*Signed*).....

NEW ENGLAND CONVENTION OF CENTRAL STATIONS, ELECTRIC VEHICLE MANUFACTURERS AND ALLIED INTERESTS

On Tuesday and Wednesday, May 20th and 21st, the New England Convention of Central Stations, Electric Vehicle Manufacturers and Allied Interests was held at the Engineers' Club, Boston, Mass. Papers were read, synopses of which follow:

New England as an Electric Vehicle Field

BY FRED M. KIMBALL

New England has always led in the encouragement of the electric vehicle industry. It has likewise been generous in supplying money for the development of this field. The sad experience of the electric cab service in Boston in 1905 proves the deep interest of New England business men in the electric motor car. This territory is admirably suited to the electric pleasure car on account of the uniformly good boulevards and the well-developed system of electric charging stations in nearly all of the large centers. New England is also an admirable territory for electric trucks, in consequence of the low rates for electricity offered by practically all of the central stations and in consequence of the establishment of admirable garage service in many of the manufacturing districts. The paper shows wherein New England has been, is, and will be a profitable territory for the exploitation of the electric vehicle.

Central Station Service for the Owners of Electric Cars

BY L. R. WALLIS

It devolves upon some interested party to provide the information to render the service required for the intelligent operation of an electric motor car. The interest and responsibilities of the manufacturer and the central station are very closely allied and it becomes difficult to differentiate between the character of service that each should render. If a distinct line were to be drawn between the service to be furnished for the manufacturer and the central station, it would appear to be equitable to make the division on the basis of supervision of that portion of the equipment supplied by each. The manufacturer's agent should advise the central station of the details of his sales. The central station should then be able to recommend the best charging apparatus for that specific installation, and should render assistance if desired, in procuring and installing it in the customer's premises. The central station can further assist in the introduction of electrics by establishing a rate for charging current which is equitable in consideration of the class of business by educating the public of the advantages of the electric through advertising ment of vehicle and battery engineering. It is also the province of the central station either to establish public charging stations

or to use its influence in inducing others to open electric garages in its territory. Service must be rendered—though the user of a car is slightly concerned by whom. If each factory in the business does just a little more than he considers his share, no one need have any misgivings as to the future of the electric vehicle.

How a Central Station Can Develop Its Electric Vehicle Load

BY W. C. ANDERSON

The Boston Edison Company has led in aiding the development of the electric vehicle industry by such moves as the establishment of an exclusive electric garage, by a reduction in power rates for battery charging, by the purchase of 56 electric cars for their own use, and by general publicity work. Even in the smaller cities, where the promotion of the industry will be on a smaller scale, the central station manager should use his best influence to see that a responsible dealer in his city represents a line of electric cars of some standard make. If such a dealer cannot be easily located in the city, the power company itself should handle the proposition until a representative of the proper calibre is found. After the selling of a car, which is to be kept in a private garage, the central station should give their part of the installation immediate attention. The establishment of a low rate for battery charging for both public and private garages will greatly assist the dealer in marketing his cars. Many New England stations have already assisted the introduction of the electric along these and other lines, such as the battery exchange system recently established at Hartford. Co-operation with vehicle manufacturer is the solution of the central station's "off-peak" problem.

Constructive Criticism

BY E. R. DAVENPORT

This paper advocates three developments with regard to selling electric cars. First, a reduction in the retail price of pleasure electrics; second, a better class of salesmanship for both pleasure and commercial classes; third, closer co-operation of the manufacturers or their dealers with the central stations in furnishing service to the purchaser of electric cars. There is pointed out the desirability of making demonstrations in connection with soliciting sales of commercial cars. The salesman should have more intimate knowledge of their own line of cars and the use to which they may be put than is now customary. A number of cases are cited wherein the purchasers of electric cars have been thrown upon the local central station for receiving service as regards inspection and repairs. The car manufacturer, the battery manufacturer, and the electric lighting companies are all deeply interested in the success of electric cars. The New England central stations are already selling electric charging current at very low rates and are ready to co-operate further to any reasonable extent with the car manufacturers.

Lansden Electric Truck Company, Newark, N. J., is moving to Allentown, Pa. The new home of the Lansden Company will be the plant of the Webb Company and the Maccarr Company.

The Electra Manufacturing Company, 11 Jones Street, San Francisco, Cal., has been incorporated under the laws of California, for $250,000, to manufacture electric pleasure and commercial cars.

New York Electric Vehicle Association has just issued an interesting handbook for distribution among electric vehicle users. It contains a list of charging stations in New York, on Long Island, upstate as far as Hudson, east as far as New Haven, west as far as Easton and south to Philadelphia and Atlantic City. There are also chapters describing different types of storage batteries, with instruction for their care and operation.

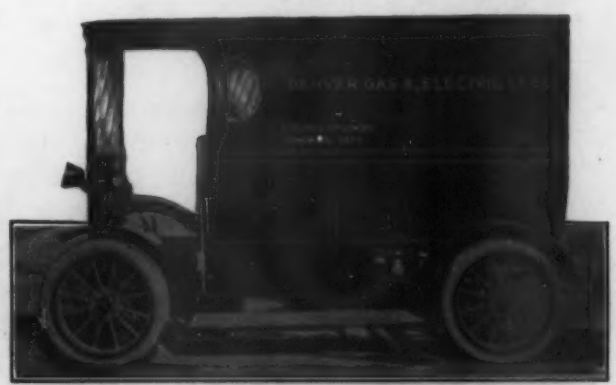
MOTOR TRUCKS IN U. S. GUN FACTORY

At the Frankford Arsenal, Frankford, Pa., a one-ton G. M. C. electric has recently been installed and is now doing the work that formerly required three horse wagons and nineteen men. Records at the Arsenal show that these men received pay averaging more than $2 a day, and that the cost of current required to run the new truck is less than 1 cent per mile, electricity being generated at the Arsenal.

This truck transfers all the raw and finished material from one building to another. Being an electric it may be operated with safety in the various buildings where ammunition is manufactured. Each of the main buildings is provided with a ramp, or inclined driveway, running from the street into the building. The truck runs up these ramps with ease and delivers material to the exact spot where it is wanted, doing away with four or five separate handlings of material—which formerly were necessary. The speed of the vehicle is 11 miles per hour, and it runs daily an average of 35 miles. The average expense per day for current has never been more than 30 cents.

GMC Electric at the Frankford Arsenal

THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA, 124 West 42nd Street, New York City, for the good of the association and the industry at large, is endeavoring to increase its company membership in its active auxiliary and press classifications, and as an inducement has reduced the dues, from now until the end of the fiscal year, 50 per cent. of the annual fee. The Press Membership has been reduced from $25 to $10 per year.



A Newcomer in the Field

The illustration shows a 1000 lb. electric delivery, built by the Capitol Truck Manufacturing Company, 426 Empire Building, Denver, Colo. This company has been incorporated early this year and the manufacture of the above vehicle in quantities has now actively begun. The general specifications of this truck are worm drive, General Electric motor and controller, 30 cell Gould battery, 104 in. wheel base, 34 x 4 in. pneumatic tires, 9 to 1 gear reduction, American ball-bearing axle and full-elliptic springs.

The Superior One-Ton Truck—An Assembly Comprising High-Class Parts

THE Superior truck has a capacity of one ton and is the product of the F. G. Clark Company, Lansing, Mich. This truck is made up of such units as the Rutenber motor, Bosch magneto, Sheldon axles, etc., all of which parts are of such well-known quality, that the accessibility, simplicity and durability become predetermined factors in the complete unit.

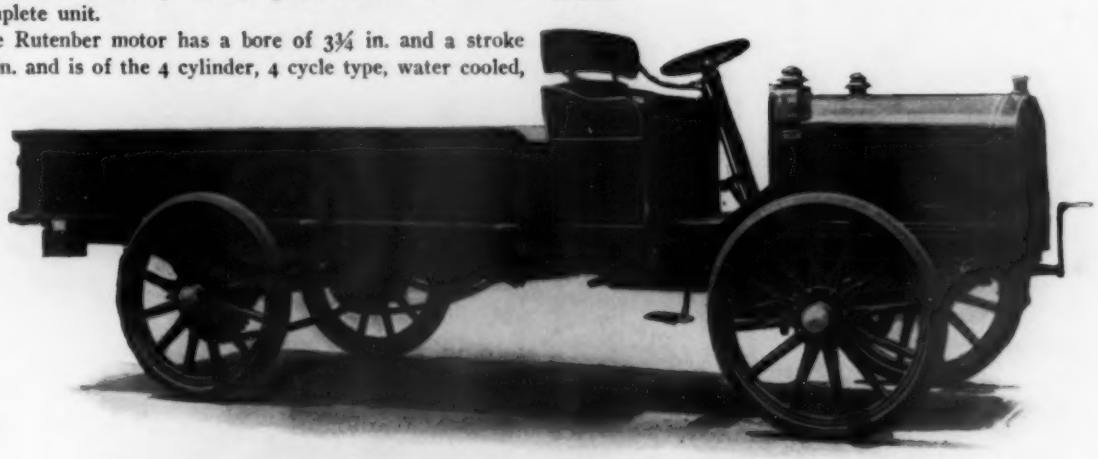
The Rutenber motor has a bore of 3¾ in. and a stroke of 5¼ in. and is of the 4 cylinder, 4 cycle type, water cooled, with valves all on one side, enclosed by cover plates, thumb-nut retained. The clutch, of cone type, is leather faced with spring inserts. The Bosch magneto is located at the forward end of the motor together with the water pump, and driven through a transverse shaft. The oil pump is of the plunger type, operated by connecting rod and plunger from eccentric on cam shaft.

A Covert selective sliding gear transmission is employed, with Hyatt high duty type roller bearings and nickel steel carbonized, heat treated gears. This unit is located on the jackshaft and drives the rear wheel through Diamond chains. Spicer universal joints are used on the propeller shaft.

The front axle is a one-piece drop forging of heavy I-beam section. The steering knuckles and arms are very heavy and reinforced to give extra strength. All moving parts are bushed. The rear axle is rectangular in section, forged from a single piece of special steel.

Springs are of the semi-elliptic type made of special steel. The front spring is 40 in. long and rear spring 48 in. long, both 2¼ in. wide. On the top of the rear axle and on each side directly under the frame is a coil spring, which comes into play when a load of 1500 lbs. is put on.

The service brakes are operated by a foot pedal and are located at the outer ends of the jackshaft. The emergency brakes, operated by a hand lever, are located on the rear hubs and are internal expanding, as are also the service brakes.



The Superior One-Ton Truck with Express Body; Price $1800
Rutenber motor; Covert transmission; Sheldon axles; Bosch magneto; Hyatt roller bearings; Spicer universal joints, etc.

The wheels are 36 in. in diameter, have fourteen 2-in. spokes and are made of second growth hickory. The hub flanges are 10¼ in. in diameter. The brake drums, to which the rear sprockets are riveted, are fastened to the wheels by a bolt through each spoke. Standard tire equipment consists of Firestone solid wire tires, 36 x 3 in. front and 36 x 3½ in. rear.

The frame is made of special cold pressed steel 3-16 in. thick. The side members are 4½ in. high, 2 3-16 in. wide. Five cross members are thoroughly riveted and heavily gussetted. The frame is 173½ in. long and extends the entire length of body. The steering gear is of the heavy type, worm and sector gear, adjustable. The steering wheel is on the right.

The Superior truck has a wheelbase of 110 in. and the chassis weighs 2500 lbs. The height of loading platform is 31 in. and the carrying space is 105 in. x 46 in. The gasoline tank has a capacity of 10 gals., 2 gals. of which are reserve.

The chassis is listed, including driver's seat, side and tail lamps, jack and tools, at $1700. Complete with either standard stake or express body, the price is $1800.

Brockway Two-Cycle Air-Cooled Commercial Car

THE Brockway Motor Truck Company, of Cortland, N. Y., has brought out a line of trucks, offered in four models, A, B, C and D, rated at 1000, 2000, 2500 and 3000 lbs. carrying capacity, respectively. These trucks feature an air-cooled, three-cylinder, two-cycle motor, which is entirely built in the company's own plant, as are also all other parts which enter into the construction of the Brockway trucks.

A Two-Cycle Power Plant

The two-cycle air-cooled motor is located in front, under the hood, where every part is accessible, and has a bore of 4 in. and a stroke of 5 in. in all models excepting Model D, in which the bore is 4½ in. It is of the three port type and has three air-cooled cylinders cast separately. The cylinders are cast from a special mixture of tough, close grain iron and the crank shaft is of generous diameter, made from a special alloy steel. All bearings are of hard bronze alloy, hand fitted. The crank case is provided with large hand holes, through which the connecting rod bearings may be adjusted. The motor is supported in the chassis at three points, the rear cross rail being bolted rigidly to the base, while the front is supported by a universal connection.

Two Thousand Pound Capacity Brockway Truck With Panel Body, Model B

The lubricating oil is mixed with the gasoline in proportion of one qt. of oil to five gal. of gasoline. The mixture passes through the spray nozle in the carburetor. The current of air sweeping by the spray plug vaporizes the gasoline, leaving the oil suspended in the vapor in the form of a fine mist. This finds its way into the motor and is deposited on the exposed surfaces of the moving parts. The quantity of oil varies with the amount of gasoline used, so that when the engine is working hard it receives more lubricating oil than when working under a light load.

Brockway Model A, One Thousand Pound Capacity Truck With Express Body

The air cooling of the motor is by a powerful suction fan, of the centrifugal type, made in connection with the flywheel. This draws a strong current of air from the front of the hood over the fins cast on the cylinders. The hood and engine boot enclose the motor, so that the action of the flywheel fan exhausts the warm air from about the engine, causing a strong draft of air through the openings in the hood directly around fins on each cylinder.

Carburetion is produced by means of a Holley carburetor, and ignition is accomplished by a Bosch magneto with fixed spark.

Transmissions, Axles and Springs

In Models A and B a planetary type of transmission is employed, having two speeds forward and reverse, and enclosed in an oil-tight case. Low speed and reverse are operated by pedals, while high speed is operated by a lever. On

Brockway Model D, With Stake Body, Three Thousand Pound Capacity

Models C and D, equipped with cone clutch, the transmission is of the selective, sliding gear type, having three speeds forward and reverse. Drive from transmission to jack shaft is through shaft and from here to rear wheels by side chains.

Model A is fitted with a forged steel rear axle, 1¾ in. square, with 1 11-16 in. spindles. The front axle is also of forged steel, 1½ in. square, with same sized spindles. The other models have rectangular rear axles of the same material, 1¾ in. x 2¾ in., with 1 15-16 in. spindles. The front axles in these models is of I-beam construction, 1½ in. x 2½ in., with 1 11-16 in. spindles.

Model A is equipped with full elliptic springs, front 1¾ and rear 1¾ in. All other models have platform type of springs at the rear, 2½ in., and full elliptic springs in front, 2 in.

Wheels, Tires and Brakes

Wheels are of the wood artillery type, 36 in. in front and 38 in. at the rear, fitted with solid tires 2 in. in front and 2½ in. at the rear on Model A, mounted on clincher rims; Models B and C are fitted with 2½ in. solid tires in front and 3 in. tires at the rear, mounted on the flange type of bolted on rim and Model D is equipped with 3 in. tires in front and 4 in. at the rear.

On both Models A and B the brakes are of the internal expanding type, operating direct on rear wheels; while on Model C the emergency brake is internal expanding direct on rear wheels and the service brake is also internal expanding on jack shaft, and on Model D the service brake is external contracting on rear wheel brake drums, and the emergency brake is internal expanding, also on the rear wheel brake drums.

The wheelbases are 100, 106, 106 and 112 in., respectively, and the tread is 58 in. excepting Model D, which has a tread of 62 in. The steering gear is of the worm and sector irreversible type. The equipment consists of three oil lamps, horn and set of tools.

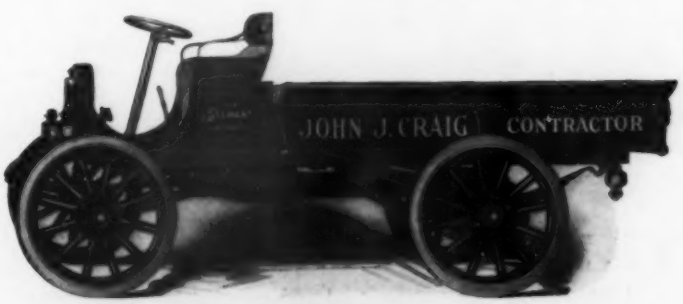
The list prices are: Model A, $950 with express body, and $1100 with panel body; Model B, $1300 with express body, and $1500 with panel body; Model C, $1400 with express body, and Model D, $1850 with express body, $1925 with stake body and $2050 with panel body.

The Stewart One-Ton Motor Truck

THE Stewart Iron Works Company, of Cincinnati, O., has entered the commercial car field, with a one ton truck. The Stewart truck is made in five different models, all built on the same chassis, differing only as concerns body construction. Model C is fitted with an express body, Model D, with a stake body, Model E, with an express body of the covered type with screen sides, Model F with closed panel body and Model G, with panel body having plate glass in sides and doors.

Power Plant

The motor has a bore of 5 in. and a stroke of 5⅛ in., is of the four cycle type, water cooled, with cylinders opposed. Oil is fed into the cylinders from a gravity oiler, which is automatic, and finds its way into the crankcase, from where bearings are oiled by splash. The bearings are made of die-cast white bronze and are interchangeable. A one-piece crankcase is employed, this of gray iron, accessible by removing oil pumps to connecting rods and main bearings.



Stewart Model C, Two Thousand Pound Capacity, $986

Ignition is by means of dual system of high tension magneto and dry cells.

The planetary type of transmission has two speeds forward and reverse, and is especially designed, with 1⅛ in. face, nickel steel, heat treated gears. The clutch is of multiple disc type, encased in a separate oil-tight compartment of the transmission case.

Jack Shaft, Frame and Axles

The differential and jackshaft, contained as a unit, is of the bevel gear type, mounted on Hyatt roller bearings; it contains vanadium steel drive shafts, which drive side sprockets with Baldwin roller chains to rear wheels.

The frame is of special channel steel of ample proportions, made strong and rigid by cross beams and hickory reinforcements. The length over all including body is 12 ft. 6 in. Wheel base 95 inches.

The tubular type of axles are 2½ in. in diameter in front and 2½ in. in diameter at the rear. The front axle is built up of carbon steel, with drop-forged steel ends and steering knuckles. The rear axle is built up with drop-forged steel ends.

Wheels, Tires, Etc.

Wheels are of the wood artillery type, with twelve 2 in. spokes at the rear and twelve 1¾ in. spokes in front, mounted on Timken roller bearings. Tires are of the solid clincher type, 36 x 3 in. The frame is mounted on long vanadium steel semi-elliptic front and rear springs. The Stewart models are listed at $986, $986, $1096, $1246 and $1296 respectively, as above mentioned. The express body on the truck illustrated is 7 feet 7 in. long and 3 feet 10 in. wide. Height of side is 11 inches.

The truck will foster habits of promptness, thoroughness and decision

The International Fifteen Hundred Pound Delivery Truck

A NEW light delivery truck, of 1500 lbs. capacity, is the latest addition to the line of International motor trucks, put on the market by the International Motor Company, New York City. This truck will now be placed on the market in addition to the other nine sizes of motor trucks which this company puts out.

A motor of the monobloc type is installed, having 4 cylinders, with a bore of 3½ in. and a stroke of 5½ in., and supporting arms, brackets, etc., connected with the motor, making a complete unit. The lubricating system is of the enclosed pressure type, with a single tube to pressure gage on dash; completely enclosed valves guarantee quiet operation, and all moving parts are completely protected against water and dirt.

Valve Side of the International Motor
Showing drive of the magneto and centrifugal water pump

A honeycomb radiator, a centrifugal pump, and a fan comprise the cooling group. Ignition is accomplished by high tension Bosch magneto with fixed spark. The automatic double jet carburetor is water jacketed.

The clutch is of the multiple disc type, running in oil, all moving parts being supported on annular ball bearings. The gear box is of the unit type, all brackets and supporting lugs being integral with the transmission case; gears are of chrome nickel steel, and shafts are of the same material, mounted on annular ball bearings. This transmission affords four speeds forward and reverse.

The differential serves also as a point of attachment for the rear suspension, and consists of adjusting driving and driven bevels from the exterior. The drive from counter shaft to the rear wheels is by means of double side chains.

Left Side of International Motor
Showing intake pipe, carburetor and water pipes leading to carburetor

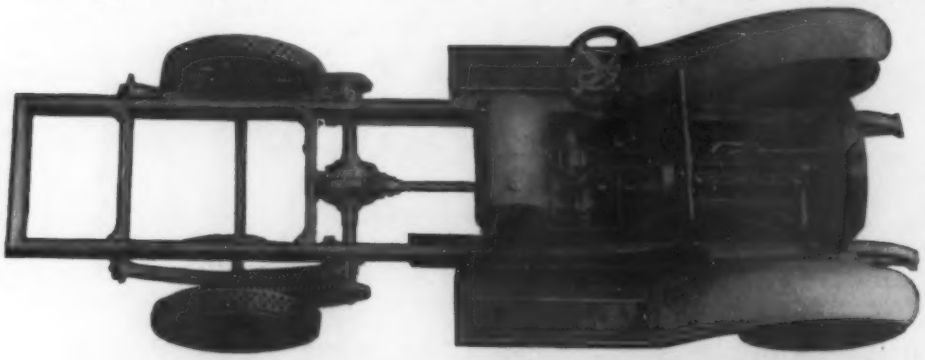
The front axle is of I-beam section, mounted on Timken roller bearings, and the rear axle is of rectangular section, mounted on annular ball bearings. The frame is made of a special heat treated pressed steel, channel section, 5 x 2 in.

The wheelbase is 128 in. and the tread is 57 in. The wheels are of the wood artillery type, 36 in. front and rear, fitted with 36 x 4½ in. pneumatic tires front, and 36 x 5 in. Q. D. solid tires rear.

The steering gear is of the irreversible type, surmounted by an 18 in. wheel. The service foot brake operates on a drum attached to transmission through the differential, and the emergency hand brake is of the internal expanding type, operating on the rear wheels. Drive is from the left, with central control.

The chassis is suspended on semi-elliptic springs, 40 x 2 in. front, and 50 x 2¼ in. rear, made of silico-manganese steel.

The gasoline tank has a capacity of 25 gal. and the oil tank 2 gal. Equipment consists of full set of tools lamp and horn.



Top View of the International Fifteen Hundred Pound Chassis

The Secondhand Truck

BY LEN G. SHAW

"TO be perfectly frank, I'd rather not sell you anything we have in the line of a second hand truck," said Dingman.

Wallace blew a cloud of smoke into the air, then gazed at the man opposite as though uncertain whether he understood aright. Dingman met the gaze squarely.

"Are you out of your head?" ejaculated Wallace, unconsciously sliding his chair back as though to get out of range of possible danger.

Dingman's face colored a bit, but his voice was steady.

"I am perfectly sane," he replied. "I repeat that I'd rather not sell you one of those used trucks we have in stock."

Wallace grinned insinuatingly, and the black cigar tilted upward as the smile grew more expansive.

"Why not?" he persisted.

"For several reasons," explained Dingman. "In the first place, I don't think you know what you want—or, rather, what you need."

The black cigar was hurled from its resting place by the force of the explosion that followed, and went rolling halfway across the table, leaving a trail of ashes in its wake.

"I don't think you know what you want—or, rather, what you need."

"You certainly are frank," sputtered the astonished Wallace.

"It's a habit I have," agreed his vis-a-vis.

Wallace picked up his cigar, brushed the scattered ashes on the floor, and resumed.

"Walters is anxious to sell me a second hand truck. Evidently you don't care as much about doing business as he does."

"I don't know what Mr. Walters' methods are," returned Dingman, imperturbably. "I do know that I had rather spoil the best sale I ever made than to shake one man's confidence in me or my establishment. That is why I am advising you as I do."

"Bravo, bravo," applauded Wallace, "that's sentimentality and red fire for you, all right."

"It is neither," objected Dingman. "It's just plain horse sense. I want a man to be honest with me. When I can't be honest with him I'll quit. It's business as well as principle, Mr. Wallace."

"Later on," he continued, after a moment's pause, "we may get hold of a used truck that I'd let you have—I know your needs. But I'd much rather sell you a new one. I wouldn't want you at the end of a month or so to feel that I had handed you one."

"If I insisted on buying a second hand truck and it didn't make good don't you suppose I'd know enough to take my medicine and keep my mouth shut?"

"No doubt. But you'd keep up an awful thinking."

"Anyhow," said Wallace, as he took his departure, "I guess I'll think it over a bit before deciding."

Robinson, head salesman, who had been a silent witness of all that took place, said nothing when Wallace had gone, but astonishment and disappointment were written all over his countenance.

"Go ahead and say it," challenged Dingman. "I know what you are thinking. You think that of all the marvels of asininity you ever encountered I am the chief boob."

Robinson moved uneasily in his chair.

"Well, I wouldn't put it quite that strong," he began, "but it does seem as though you went out of your way to spoil the sale of a used truck—and we have four on hand now."

"I don't blame you for feeling that way, Robbie, but you don't see things just as I do. Wallace may buy a truck somewhere else; but he will never be in a position to say that we stung him. That's the thing that counts."

The few days lengthened into two weeks. Efforts to make an appointment with Wallace or get him down to a definite understanding over the telephone proved unavailing. Even Dingman had about concluded that Robinson was correct in his opinion as to how a good prospect had been chased away. Then the answer arrived, reaching the two men almost simultaneously.

"I met Walters over at luncheon today," said Robinson, striding in upon the head of the house, as he was looking over the midday mail.

"I saw Wallace this noon," countered Dingman.

"Walters told me he had slipped Wallace a second hand truck," went on Robinson.

"Wallace told me the same thing, only he didn't say that he had been slipped one," said Dingman.

The excellence of their team work caused both men to laugh heartily.

"But that doesn't help out much on the sale we lost," complained Robinson, settling down to sober consideration of the case.

"Well, our skirts are clear," argued Dingman.

"Even if our sales floor is not," added Robinson, with a wry face. "Perhaps your theory is right, but I can't see it."

"We'll hope for the best and keep hustling, anyway," concluded the head of the house, turning again to the pile of correspondence.

A fortnight later a choleric individual presented himself in the office of Dingman & Company. It was Wallace. Indignation fairly exuded from every pore as he was ushered into the inner office.

"That scoundrel of a Walters," he exploded, settling into the proffered chair, and then jumping up in his excitement.

Dingman waited for his caller to proceed. Robinson, who had just come in, stood all attention.

"He certainly handed me a lemon,"stormed Wallace. "Sold me a truck that wasn't fit even for a junk pile. Charged me a good round price, and it never ran two hours at a time without having to go back to the shop for repairs. A fellow like that ought to be put out of business. If he had anything I'd sue him for damages."

Dingman waited until Wallace's wrath had cooled a bit.

"What can we do to help you out?" he inquired.

"You can sell me a brand new truck," said Wallace, seating himself. "I know what you're thinking. You're saying to yourself, 'I told you so.' And you did. That's why I'm back here. If I'd had sense enough to take your judgment in the matter in the first place I'd have been several hundred dollars to the good, but I didn't, so now I'm going to start all over. You were honest with me, and I'm going to trust you implicitly in this matter. Tell me just the truck I want for my business, and I'll sign up right now. No more experimenting for yours truly."

When Wallace, with a contract bearing his signature reposing on the desk, was well out of hearing, Robinson ventured to speak.

"Well, you finally won out," he said. "I guess your judgment was better than mine, all right."

Dingman smiled.

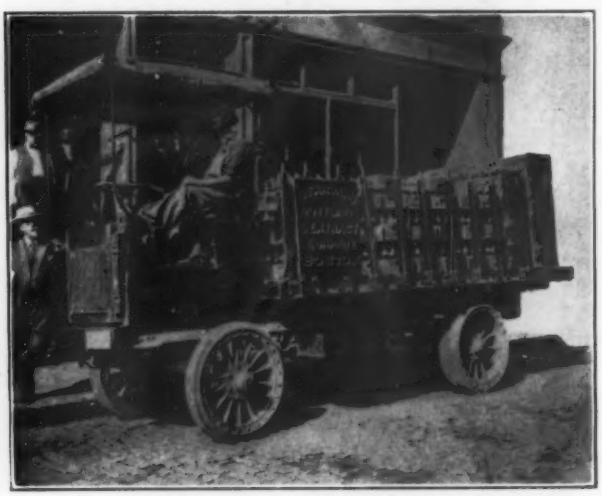
"Rather indignant, wasn't he," he drawled.

"Mad clear through."

"And there's a fellow who insisted that if he was handed one he would take his medicine like a man and keep still."

BOTTLING WORKS FAVOR TRUCKS

The Standard Bottling Company, Harvard & Albany Streets, Boston, Mass., put trucks in service in 1911, two machines being used. The statement was made that these two trucks do more than 8 horses. For instance, on an 8 or 9



One of the Alco Machines Used by the Standard Bottling and Extract Company

mile haul, with from 40 to 50 stops, the horses will get back, but not in time to make another trip, while the trucks invariably can make two trips, making sometimes as high as 100 stops in a day. With 8 horses about $12,000 to $14,000 worth of business can be cared for, as against $20,000 with the trucks. The machines in use are both Alcos, and are cared for by the Alco Service Department. With horses, extras have to be hired occasionally, and these cost $1.00 per day for each horse, not counting in the wagons or drivers.

The cost for one year for one machine, and for six months for the other, both being 3½ ton trucks, totals $477.83, for gasoline and oil. The same drivers drive either the horses or the trucks at the same wages, so their wages are not figured in. This business is more or less a summer one, and from January 1st to May 1st, 4 months, 4 horses are employed. During the summer, from May to October, 4 months, 8 horses are used, and from October to January, 4 horses only are again in use.

Truck Operating Costs

Gas and oil, 1 truck 1 year, and 1 truck 6 months.	$477.83
Garaging, washing, etc.	390.00
Insurance—Fire and Liability	504.00
Depreciation at 20 per cent.	1520.00
Repairs	275.00
Replacements	
Tires	223.00
Total	$3389.83

Horse Costs

4 Horses Jan. 1st to May 1st, 4 months, and 4 horses from Oct. to January, 4 months	$960.00
8 Horses May 1st to Oct. 1st, 4 months	960.00
Loss in selling in fall 4 horses	300.00
Depreciation on 4 horses carried over	150.00
Shoeing for the year	368.00
Veterinary	50.00
Total	$2788.00
Depreciation on wagons, 4 wagons	200.00
Repairs and painting	200.00
Insurance	90.00
	$3278.00

MOTOR TRUCK USED TO ADVANTAGE DURING THE CHERRY SEASON

The cherry-picking season in Oregon usually finds a scarcity of transportation vehicles. Most of the extensive ranchers sell their cherry crop as it stands upon the trees, and the purchaser must do all his own picking and shipping. The season lasts about three weeks, and the commission men and agents of the canneries pack up a camp outfit and proceed with it up the mountains, where they "camp right on the job."

C. A. McCrary, of La Grande, Ore., last year used the Federal. Loaded with about 2200 lbs. of camping paraphernalia, a 16 mile trip was made up the mountain to a large cherry orchard. Ten days were spent there, and every other day the truck carried its cargo of cherries, 128 miles from LaGrande to The Core, where they were turned over to a local cannery.

It is predicted that this year motor trucks will be used more in making these trips than horses and wagons, because they not only save time but are economical in operation, and none of the fruit is wasted by exposure to the hot sun as when horses and wagons were the only means of transportation.

Change-Gear Design

BY C. T. SCHAEFER, Member of the S. A. E.

CRANK shafts of motors rotate at a speed consistent with the power requirements, while the road wheels must rotate consistent with road conditions, or as the operator wills, so that when the angular velocity of the road wheel changes it does not necessarily follow that the crank shaft revolution will change in the same ratio, but in order to be able to vary the rate of speed of the road wheels without changing the speed of the crank shaft of the motor to utilize a transmission, or change gear as it is more commonly termed.

If motors could be so designed as to afford an increasing torque with decreasing speed and certain relations of torque considering speed, all would be well and the change gear could be eliminated. As it is, taking into account the power of the motor at several speeds, nothing of this sort can be considered. At very low speed the torque becomes of greatest importance and this is especially true in commercial car operation. The function of the change gear is to provide a variation in speed between the crank shaft of the motor and the road wheels of the vehicle, maintaining the torque as near constant as possible.

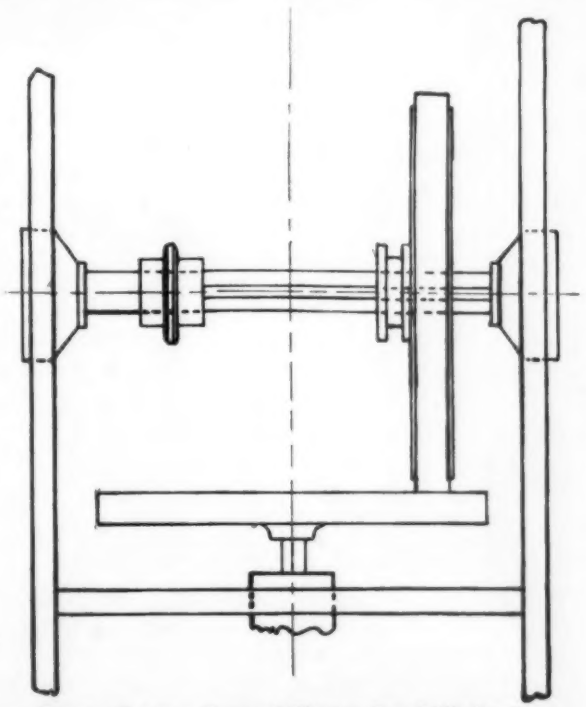


Fig. 1. Friction Type of Change-Speed Mechanism, With Single Disc

It is generally understood that to reverse motion of the automobile motor is to labor under disadvantages in numerous ways. Power will be lost owing to the inferior valve timing relation, which must follow if the cam shaft was designed to

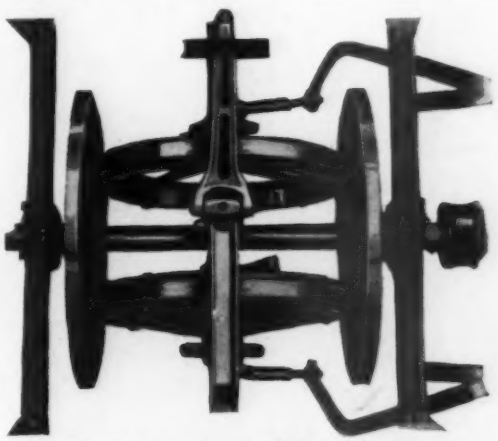


Fig. 2. Friction Type, With Double Disc

suit reversing conditions. Unless certain complications were introduced in the valve action and since in any case it would be necessary to add to the flexibility the motor by the use of a change gear, it would seem unnecessary to add to the valve motion anything by the way of complicated devices. An addition to the gear set is less complicated and the end is adequately served.

The most popular type of change gears are the friction, planetary and sliding gear. The friction and planetary, with few exceptions, are used only on the light commercial cars, while the sliding gear type is extensively used on all sizes of commercial cars.

The Friction Change Gear

There are two types of friction change gears in use at the present writing, the single disc and the double disc. This single disc type consists of a driving disc which is attached to the flywheel or an extension of the crank shaft and always rotates with it, and a driven disc which can be slid along a cross shaft and brought into frictional engagement with the driving disc. By moving the driven disc out from the center of the driving disc the speed can be varied from nothing to maximum, and by sliding it to the opposite side, the direction of motion is reversed. Before the wheel is slid in the direction

of its axis it must be disengaged from the driving disc; this is accomplished by either moving the cross shaft and its bearings or by moving the driving disc. From this cross shaft the final drive may be through a single chain to the rear axle, or it may be be through a single chain to the jack shaft and then through double side chains to the road wheels.

Fig. 1 depicts this type of change gear, while Fig. 2 depicts the double disc type used on the Service commercial cars. In this type the driving shaft has two discs which come in frictional contact with two driven discs, which are supported on separate shafts, forming a separate drive to each road wheel, thus eliminating the use of a differential. The Service, Best, Seitz, Lambert, Wolverine and several others use the friction change gear.

This type of change gear serves the purpose of a speed changing mechanism, reversing gear and friction clutch, the advantages claimed being extreme simplicity, low cost of construction and maintenance, silent operation and unlimited speed graduations. The disadvantages are unavoidable loss of power due to the slipping at the contact surface and its tendency to be impaired by oil, mud, etc.

The Planetary Change Gear

Planetary change gears are cheaper to manufacture than sliding gears and also require much less skill in their operation. There are two types of planetary gears, those comprising internal gears and those comprising only spur gears in their makeup. The latter is the most popular type and will be considered in this article.

Fig. 4. A Three-Speed Progressive Type of Change Gear, With Integral Jack Shaft

Fig. 3 depicts this type of change gear, being enclosed in a dust-proof case and with its driving shafts mounted on ball bearings. The principle of either type of planetary change gear may be depicted as follows:

The driving shaft "A" carries the driving pinion "B" meshing with the planetary pinion "C." The latter forms part of sets of three pinions which are formed integral. "D" is the low speed planetary pinion meshing with the low speed gear "E" which is secured to the driven shaft "F." By applying the brake band "G" to the combined pinion carrier and brake drum "H," the planetary pinions are held stationary in space and act like a back gear. Pinion "B" rotating right handedly, turns pinions "C" and "D" on their pin left handedly and pinion "D" turns pinion "E" and driven shaft "F" right handedly; that is, in the same direction as the driving pinion "B." For reverse brake band "I" is applied to the brake drum "J" which has the reversing pinion "K" keyed to it, being thus held stationary, when pinion "B" is rotated by the engine planetary pinion "L" is forced to roll on "K" in a left handed direction, carrying the pinion pin "M" and pinion carrier "H" with it.

Direct drive is obtained by engaging the high speed clutch "N," which locks the reversing gear "K" to the driving shaft "A" and since two equal gears "B" and "K" are now secured to the shaft "A" the planetary pinions are locked against axial motion and the whole gear revolves as a unit.

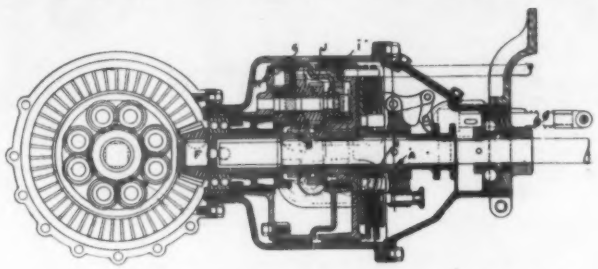


Fig. 3. Planetary Type Combined With Jack Shaft

This type of change gear may be combined in a unit with the jack shaft, and mounted upon three points of support or it may be combined in a unit with the motor. This type of gear usually provides two speeds forward and reverse, although 3 speeds forward and reverse may be obtained at the expense of considerable complication.

Sliding Gear Type

The sliding gear type consists of two parallel shafts mounted on suitable bearings in a housing on gear case. The first of these shafts is known as the primary or main driving shaft. This shaft is divided into two parts, the forward or driving part and the rear or driven part, the latter being provided with a bearing at its forward end inside the former. The second of these shafts is known as the secondary or countershaft. The driven part of the main shaft is either squared or provided with integral keys and carries the sliding gears, whose common hubs have squared holes or key ways to coincide with the shaft to make a sliding fit upon it. The driving part of the main shaft is provided with a gear which meshes with a gear on the countershaft forming a drive for the latter. The countershaft has a number of gears fixed upon it depending upon the number of speeds. The gears on both shafts are so spaced that shifting either gear or set of gears on the driven part of the main shaft, the corresponding gears of the two shafts can be brought into mesh successively sliding set is accomplished by means of a hand lever conveniently located to the operator and connected through a suitable linkage with a shifter rod which is located inside of the gear case. This shifter rod carries a fork which is attached to the gears in such a manner as to permit them to rotate with their shaft.

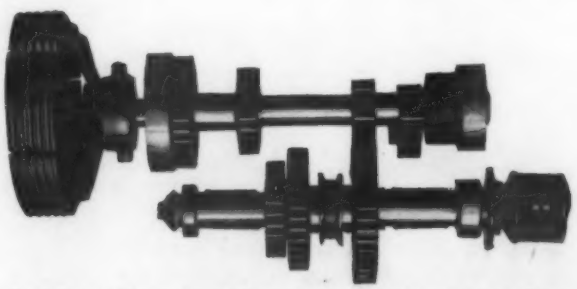


Fig. 5. A Three-Speed Progressive Nondirect-Drive Type

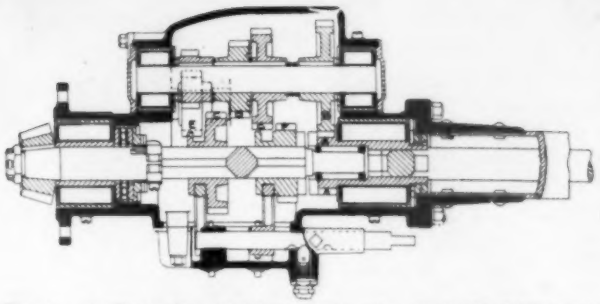


Fig. 6. A Three-Speed Selective Type for Jack-Shaft Mounting With Torque Tube and Horizontal Shafts

There are two common arrangements of shafts. In some cases the countershaft is located below the main shaft, while in others the two shafts are located in a horizontal plane.

When the shafts are placed vertically the case is invariably cast in one piece with a large hand hold cover plate for inspection purposes. When the shafts are placed in a horizontal plane, the case is sometimes cast in one piece with cover plate, while in others it is in halves joined through the centers of the bearings.

There are four general methods of mounting these change gears.

Combining them with the motor thus forming the unit power plant.

Sub-frame mounting.

Main frame mounting on cross members.

Combining them with the jack shaft as a unit.

All these mountings may be made with a more or less degree of flexibility. Three point support is most generally resorted to, so as to relieve the case of the stresses set up by frame weaving due to road irregularities.

Progressive Type of Change Gear

In the progressive type of sliding change gear, all sliding gears are moved simultaneously, when a speed change is made. The several speeds are arranged in a fixed succession as the combination of sliding gears is progressively shifted. It is thus necessary when passing from one speed to another not next to it to momentarily mesh the gears of the intervening speed. It is true with this system that less skill is required when it comes to accelerating a commercial car, since as stated above, it is necessary to shift into the low speed gear first and progress to the high gear.

Fig. 4 depicts a progressive type of change gear providing three speeds forward and reverse, which is used on the Mogul, Harder, G. M. C. and quite a few other large trucks. It consists of a main shaft connected to the clutch by means of a universal joint and a shaft. This shaft carries the two sliding gears which mesh with the gears on the secondary or counter shaft.

For the low speed the sliding member "A" is slid forward so that the gear "B" will mesh with the gear "C" on the countershaft. Second speed is obtained in like manner by meshing sliding gear "D" with gear "E" on the countershaft. High speed is obtained by meshing gear "D" with the internal gear "F" formed integral with the constant mesh gear. Thus the high speed is a direct drive through the change gear. For reverse gear "B" is meshed with the reverse gear "G" which is constantly in mesh with the countershaft gear "H." This also depicts a change gear which is combined in a unit with the jack shaft, a larger cover plate being provided for inspection purposes and the removal of gears and shafts.

Fig. 5 depicts the Mais non-direct type of change gear, the principle of operation being similar to the above excepting that the high speed is obtained by meshing gears instead of using direct drive through jaw clutches. The final drive is also transferred from the main shaft to the countershaft, permitting straight line drive from change gear to the rear axle. It is claimed that with this construction all gears are equally efficient. The change gear with the clutch is built in a unit with the motor, while the rear axle is of the internal gear type. This type of change gear is also used on the Garford, Studebaker and several foreign makes of commercial cars.

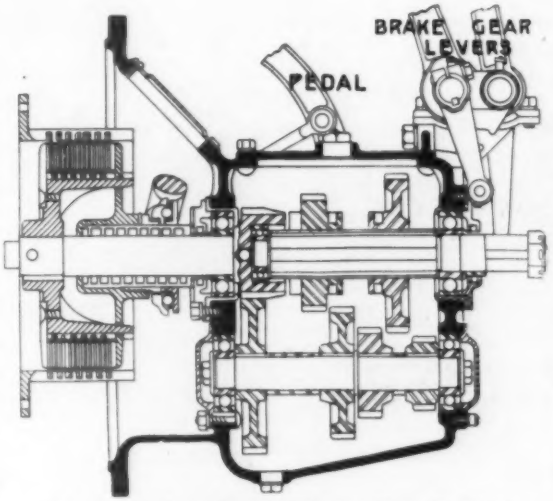


Fig. 7. A Three-Speed Selective Type for Unit Mounting With Motor

Selective Type Change Gear

The principal objection to the progressive type of change gear is that it requires long shafts, which are likely to be insufficiently rigid and to spring and bend under the thrust of the gear teeth, causing noisy and inefficient operation. The great length of this change gear is mainly due to the fact that the gears on each of the shafts must be spaced relatively far apart so as to avoid interference.

This objection is overcome in the selective sliding type, as two sliding sets are used. By comparing the two types it will be noted that the latter is much more compact. It also has an advantage in that the operator may change directly from one speed to any other without passing through the intermediate gears.

Fig. 6 depicts a three speed forward and reverse selective type change gear, so constructed that it may be mounted directly upon the jack shaft and supported at the front end by a torque tube mounted upon a frame cross member. The primary shaft is squared and carries the two sliding gears, which are operated by independent shifter rods. The countershaft is driven through the constant mesh gears "A" and "B," "A" being driven by the drive shaft extending from the

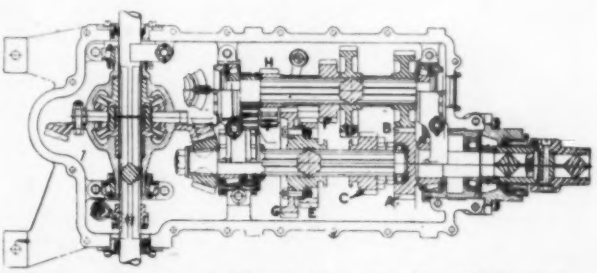


Fig. 8. A Four-Speed Selective Type Combined With Differential and Driving Gear for Three-Point Mounting

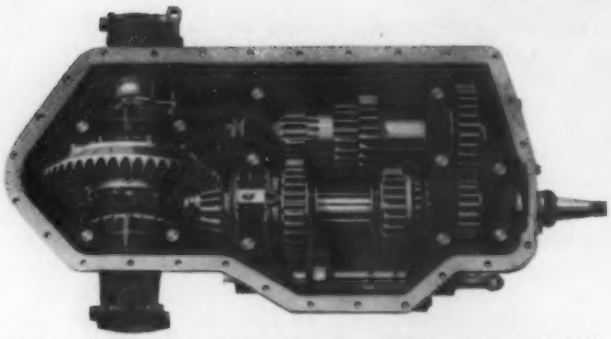


Fig. 9. A Three-Speed Selective Type With Constant-Mesh Driving Gear Supported Between Two Bearings

clutch. In effecting the different speeds, gear "C" is moved forward and meshed with gear "D" for low speed, while for reverse it is moved backward and meshed with the reverse pinion "E." For intermediate speed the gear "F" is meshed with "G," while high speed is direct, the jaw clutch on the gear "F" being meshed with the jaw clutch on the constant mesh gear "A." The shifter rods are provided with spring interlocks, so that both gears cannot be shifted at the same time.

It also depicts a construction in which the case can be used in two different positions, that is when the shafts are placed horizontally as shown, the shifter rods are on the right hand side and when the shafts are placed vertically the shifter rods are above the shafts. The case is built in one piece and provided with a large inspection plate, while the shafts are mounted upon Hyatt roller bearings. This type of change gear is used on the Federal, Kelley and several other trucks.

Fig. 7 depicts another type of three speed forward and reverse selective type of change gear, differing from the above in that the clutch and clutch housing are formed integral, so that it may be combined in a unit with the motor. The shafts are placed vertically and mounted on ball bearings, while the shifter rods operate in a separate compartment on the right side and are directly connected with the control mounted on the rear of the change gear case. This type may be found on the Palmer, Menominee and several other trucks.

Fig. 8 depicts a selective type of change gear providing four speeds forward and reverse mounted upon Timken roller bearings. The construction of this type is similar to the three speed type excepting that an extra pair of gears are provided for obtaining the additional speed and that a pair of pinions are used for obtaining the reverse. "A" and "B" are the constant mesh gears, while jaw clutches formed integral with gears "A" and "C," form the direct drive or fourth speed. Third speed is through gears "C" and "D," second speed through gears "E" and "F" and low speed through gears "G" and "H." For reverse the pinions "I" and "J" are shifted so that "I" meshes with "G" and "J" meshes with "H." Any one of the four speeds may be selected by a single hand lever. Three shifter rods are used which are provided with interlocks similar to those depicted on the three speed type. The main shaft is of the integral spline type, while all the bearings are adjustable for wear. The case is divided on the horizontal line of the shafts which are carried in the lower half and retained by bearing caps, so that the upper half may be removed for inspection, adjustment or making needed repairs, without removing the unit from the chassis. The differential and driving gears are built into the case, so that the jack shaft becomes a unit with the change gear.

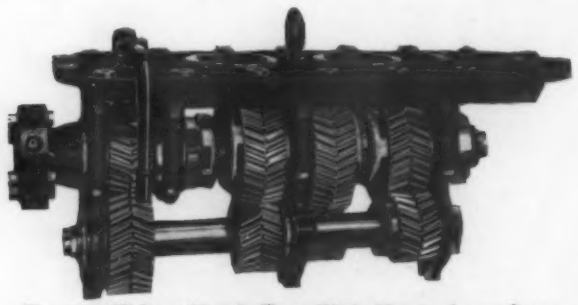


Fig. 10. Sliding-Clutch Type With Herringbone Gears and Center Bearings

Fig. 9 depicts a three speed forward and reverse change gear, recently placed on the market by the Timken Company. The method employed for obtaining speed changes is similar to those depicted above. The principal difference lies in the method of supporting the gears and the shafts. The constant mesh driving gear is supported between two bearings, while the driven constant mesh gear is placed outside the bearing, enabling the use of short and sturdy shafts, providing a sturdier support for the gears.

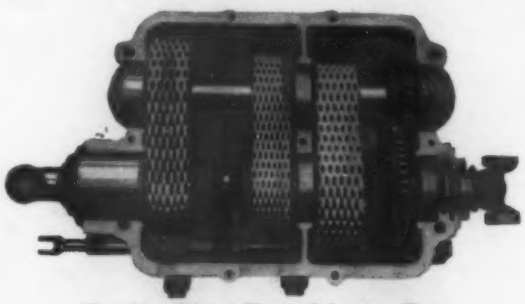


Fig. 11. Silent-Chain Selective Type

Positive Clutch Type Change Gear

This type of change gear is somewhat related to the selective sliding type. However, the gears remain constantly in mesh and the gears on the main shaft are normally free to turn thereon, but may be fixed to the shaft by positive clutches. These clutches, when of the jaw type, are similar to those used for obtaining direct drive in the selective sliding type of change gear. Internal and external gears may be used instead of the jaw clutches. The gears on the main shaft are held stationary, while the clutches are free to slide on keys or squares.

In this type of change gear the speed changes are obtained by individual clutches, but since the drive is direct through the case on high speed and the speed of the countershaft is reduced through the constant mesh gear, a provision must be made so that the latter cannot turn in its bearings. This is accomplished by disengaging a jaw clutch on the countershaft when the high speed gear is engaged. The construction of the case, bearing, mounting, etc., is similar to the types presented above. This type of change gear is used on the United States, Stromberg, Robinson and numerous other trucks.

Fig. 10 depicts the positive clutch type of change gear used on the Smith Milwaukee trucks, which differs from the above. The gears are of the herringbone, or double spiral type; they are very wide, while each shaft is mounted on three bearings, bringing each gear inside a bearing, in order to relieve the shaft springing and to relieve the gears of the greatest stresses. This change gear is located on the forward

end of the torque tube of the worm-driven rear axle and is a self-contained unit, being supported entirely by the cover. The 'Gramm, Bernstein, Mack, Vulcan and Walter also use positive clutch types of change gears.

Silent Chain Gears

Fig. 11 depicts the silent chain type of change gear which has been used by several European commercial car builders, The construction is similar to the positive clutch type, as sliding jaw clutches are meshed for the various speeds, while instead of having the various gears in mesh, they are provided with the silent type of chain which forms the method of drive. The change gear depicted employs the Coventry silent type of chain. One advantage claimed for this type over the spur gear type is that careless or unskilled operation with the latter will result in the stripping of gears, while with the former the worst that may happen is the breakage of a chain, which is inexpensive and simple to repair.

Lubrication

Change gears are usually lubricated by a non-fluid oil. For easy introduction of lubricant, a hole is provided in the cover plate, which is closed by a screw plug, while a drain plug is usually placed at the bottom so that the stale lubricant may be washed out with kerosene or gasoline. The bearing caps are invariably provided with felt washers, while all other parts are provided with paper gaskets, to prevent the lubricant from working out of the case.

COMPARATIVE OPERATING FIGURES

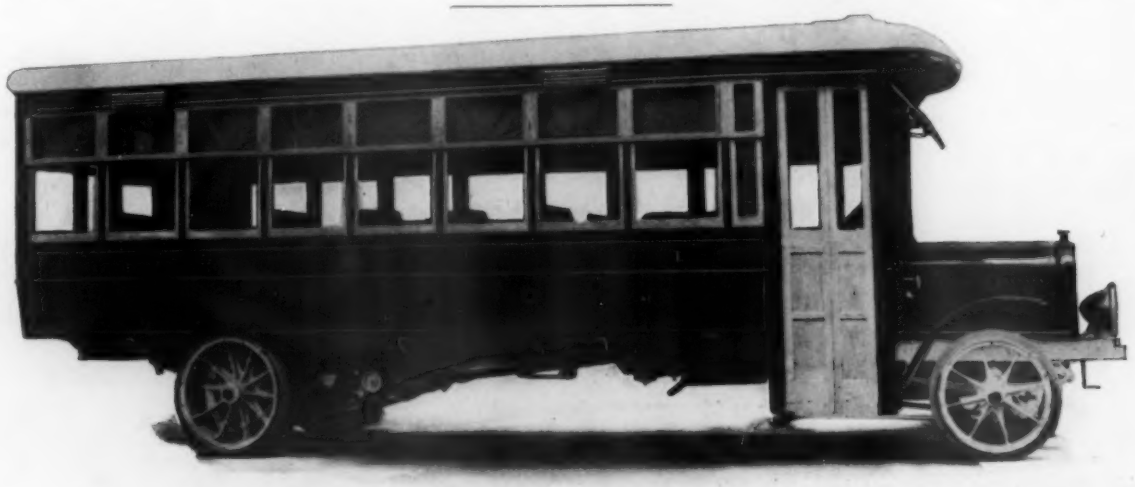
Sanford & Burton, furniture dealers in Hoopeston, Ill., report that their Kissel Kar 1500-lb. delivery truck has traveled in nine months about 8000 miles at a total upkeep expense, exclusive of driver's wages, of $209. Setting the driver's wages at $15 a week and figuring for a year the same average mileage at the same average maintenance expense, it will cost Sanford & Burton annually about $1128 to operate their truck 10,656 miles.

With this record as a basis, the Kissel Motor Car Company compares the expense of horses hauling an equal amount of tonnage the same number of miles. The statement says:

"Two good horses carrying the same burden might possibly cover an equal distance in course of a year. Assuming this to be possible, let us compare the cost with Sanford & Burton's annual expense of $1128 for the operation of their Kissel Kar. First, there is the wages of two drivers at $12 a week each. This amounts to $1248 a year. Then there is the feeding and grooming of the two horses, say 80 cents a day each, which in a year reaches the sum of $584. For other expenses, such as repairing and caring for the wagon, etc., $100, and you have a total expense for the year of $1932. With truck maintenance figures at $1128, you therefore have a difference in favor of the truck of $804.

"It is only upon the original investment that the truck suffers in comparison. Let us see how much? Two good horses will cost $300 each, or $600, wagons maybe $150 each, or $300, harness perhaps $60 a set, or $120, a total of $1020. A 1500-lb. Kissel Kar motor wagon chassis will cost $1500, with $125 extra for a standard body. That is $1625. There, you see, is a difference in initial cost in favor of the horses of $605. But the difference, you will note, is wiped out in much less than a year by the maintenance margin of $804 in favor of the truck.

"In considering these figures, it should also be taken into account that the 10,656 miles covered by the Sanford & Burton truck is small mileage for a truck of this weight. Driven in accordance with most city ordinances, this truck, exclusive of stops, would make 12 miles an hour, or 96 miles a day, if driven continuously for eight hours. Figuring on 312 working days, this would bring the annual mileage to 29,952.



A White 'Bus Operating in Pittsburgh

One of the eight largest motor trucks in use, fitted with huge omnibus bodies, built by the White Company and delivered to the Pittsburgh Auto Transit Company, is here shown. The 'bus is of the pay-as-you-enter type and has comfortable seats for thirty-four passengers. It strongly resembles street cars in size, shape and arrangement of seats. Conductors will not be carried on this line. The driver will pilot the 'bus and collect the fares as the passengers enter the side door, near the driver's seat. Ten cents will be charged for each passenger, and the 'bus will run from the downtown business section to the Highland Park residential district. The power plant consists of the White six-cylinder 60 h.p. motor, and is fitted with the White electrical system of starting and lighting. The bodies are mounted on five-ton chasses of greatly extended length.

DETROIT'S MUNICIPAL 'BUS LINE

Detroit is at present conducting an experiment with auto 'buses that is proving of interest alike to the trade and advocates of municipality owned transportation facilities.

In a section on the west side not traversed by street cars it installed a municipal 'bus line. Five Packard auto 'buses, belonging to the park and boulevard department, and used ordinarily in transporting passengers across the bridge to Belle Isle Park, were transferred to the new work.

One of the Detroit Municipal 'Buses, Operated Under Three-Cent Fares, as an Experiment

Straight three-cent fares were charged, this being the rate for which a fight has long been waged with the street car company. At the end of the first thirty days it was found that in addition to requiring all the receipts from fares to cover operating expenses, only $319 of the appropriation of $2,000 remained.

Operating Expenses

Payroll	$2,172.08
Garaging, gasoline, oil, etc.	980.83
Repairs, remodeling, etc.	343.93
Tires	324.14
Estimated outstanding bills	200.00
Total	$4,020.98
Passengers carried (30 days)	77987.
Receipts from fares (@ .03)	$2,339.61
Council's appropriation	2,000.
Net deficit	1,681.37
Balance (appropriation)	$ 318.63
Operating cost per passenger	.0515
Fare	.03
Deficit per passenger	$ .0215

Even on a five-cent rate it was found that the line would not be quite self-supporting, due largely to the class of traffic and the distance traveled.

It will be observed that nothing was charged off for depreciation, an item that would materially increase the deficit. On the other hand small allowances are made for building unloading platforms at the ends of the line, and incidental expenses in connection with the operation.

Chauffeurs are paid 35 cents and conductors 27½ cents an hour. It costs about 30 cents a round trip for gasoline, making the operating cost of each trip about 66 cents. This could be covered if eleven passengers rode each way each trip. The average was considerably more than that, but there was in addition cost of maintenance, salaries of employes other than drivers, etc.

The seating capacity of each 'bus is twenty-eight passengers. Sometimes during the rush hour sixty have crowded in.

The difficulty in making both ends meet lay chiefly in the long hauls. The same 'buses operated on the Belle Isle route at three cents, turn over a profit. Here, however, the longest haul is less than one mile. With the west side 'bus line nearly all passengers rode the full 3½ miles. Again there was only a short time in the morning and evening when traffic was heavy, the autos the rest of the time being almost empty. On the Belle Isle route the 'buses are operated as "pay as you enter" cars, cutting off the expense of conductors. Here conductors were necessary because of the stops made to pick up passengers.

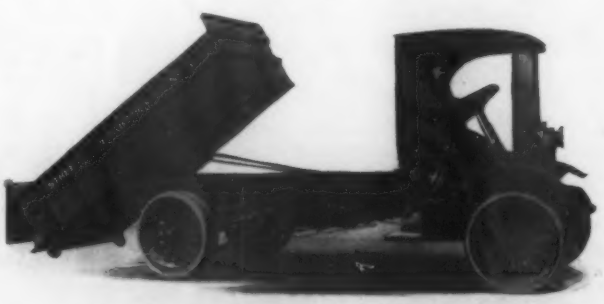
A feature of the auto service is the fact that the 'buses are able to maintain their regular schedule, in spite of the heavy strain imposed through frequent stops and starts.

In the face of the daily deficit which piles up, at the urgent request of Mayor Oscar B. Marx, the service will be continued indefinitely, the city at large paying the shortage.

THE USE OF MOTOR-DRIVEN FIRE APPARATUS INCREASES

High speed chemical and hose trucks are increasing in popularity with the fire chiefs throughout the country and many municipalities are motorizing their equipment as fast as appropriations can be obtained. The large number now in use emphasizes their great value in protective work. Chicago has eleven White six-cylinder 60-h. p. fire patrols in the service of the insurance underwriters. Recent sales of White fire trucks were made to the cities of New Castle, Pa., Dover, N. J., Easthampton and Malden, Mass., Sioux City, Iowa, and Poughkeepsie and Mount Vernon, N. Y.

That the gasoline pleasure car is more and more to become a space eliminator for fire department chiefs is evinced in the order just recently placed by the Philadelphia Fire Department with the Cole Motor Car Company for five Cole roadsters for the use of battalion chiefs. The battalion chiefs in Minneapolis use Cole roadsters to carry them around, and report that the motor car is far superior in every way to the horse.



B. A. Gramm's Three and a Half Ton Truck

Here is shown one of the new three and a half ton B. A. Gramm's trucks, manufactured by the Gramm-Bernstein Company, Lima, Ohio; equipped with a rear-dumping body and used for hauling stone, sand, etc. The city of Seattle, Wash., used this truck for road building. The body is built of steel and the dumping mechanism is operated by hand.

The truck will produce more work and of a better quality

The Latest British Four-Tonner

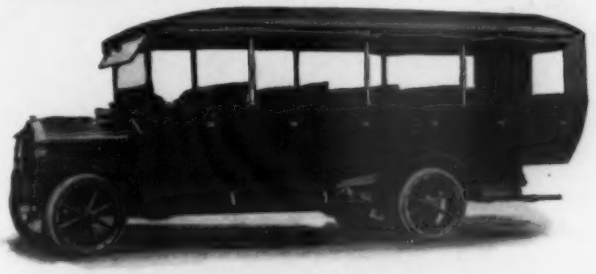
BY OUR FOREIGN CORRESPONDENT

EVER since the early days of the commercial car in Europe, the Albion name has been one to conjure with. But contrary to the general tendency of development, the Albion Motor Car Company, of Scotstoun, Nr. Glasgow, have begun with the smaller sizes and worked up to the larger. Their 25 cwt. van was the first to make a big name, and then the Albion people went out for a two, then a three tonner, while recently they have gone a step further by bringing out a four ton vehicle.

As in all sound and economically conducted businesses, existing patterns and details have been retained wherever possible, and so the new four tonner constitutes merely a forward step in low capacity of the Albion three ton chassis, the chief points of modification lying in the frame rear axle and springs, all of which have been strengthened for the extra load.

Engine Details

The engine has 4 cylinders, 4½ in. bore by 5 in. stroke, and with valves all on the left side. The crank shaft is carried on five very substantial bearings, force lubricated by a clever arrangement of plunger pumps, but beyond these points it calls for little more, except as regards the carburetion and governing arrangements. Mounted on the front extension of the crank shaft the Murray centrifugal governor regulates to a maximum of 1050 r. p. m. and controlling both the load and speed valves indicated in the accompanying illustration, yet by a simple control lever on the steering column it may be set to govern at anything from 200 to 1050 r. p. m., while a diluting air lever, fitted above the gasoline tank, enables local or

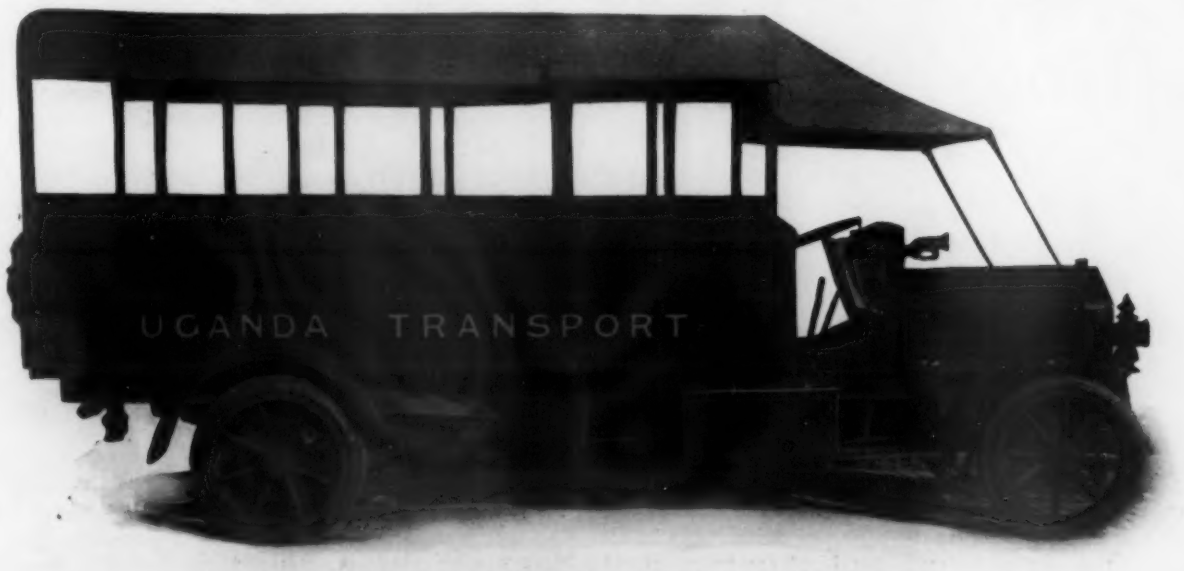


A 32 h.p. Albion Chassis With Passenger-Carrying Char-A-Banc Body

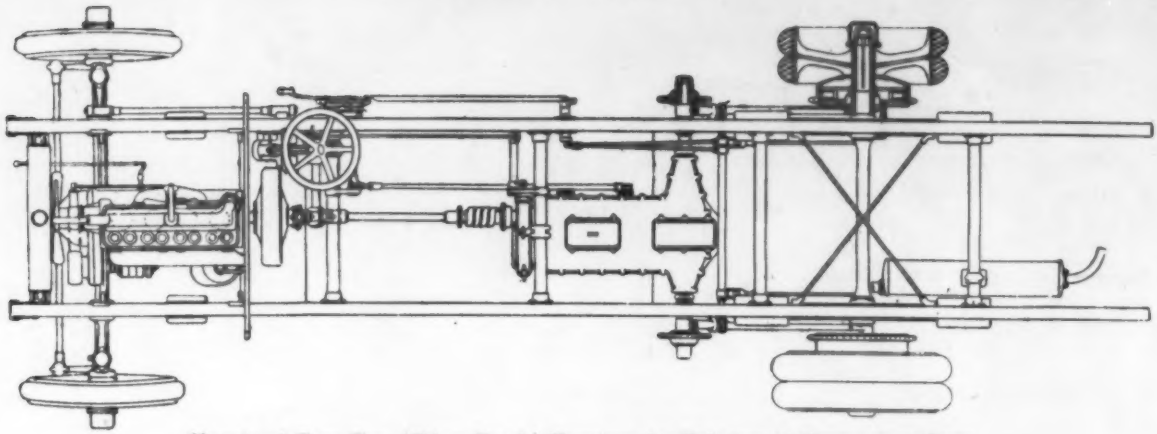
climatic conditions to be met, these in addition to the constant air valve, which at starting is automatically closed by bringing into action a half compression cam device. This has been found specially useful in cold weather.

Side-Chain Transmission Used

A single plate clutch of the grip type, on the metal to Ferrodo surfaces, enables the power to be transmitted very



The Four-Ton Albion Chassis Adapted to Colonial Freight Purposes

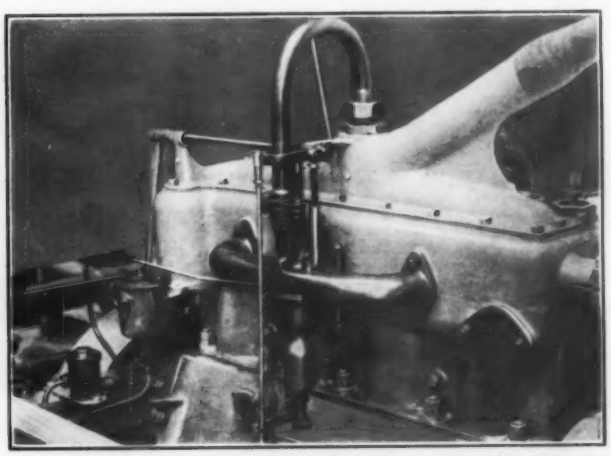


Chassis of Four-Ton Albion Truck, Showing the Relation of Component Parts

gently through the spring drive, seen in the plan drawing, to the gear box, which affords 3 speeds and includes the casing and the differential of the chain driving counter shaft. At normal engine speed, the highest gear gives 12 m. p. h., but one of the advantages of side chain transmission, by simply fitting smaller pinions to the roller chains, this maximum can be reduced to 9½ m. p. h.

Radius-Rod Design

One of the most distinctive parts of the design is in the deep triangular girder combined radius and torque rods which

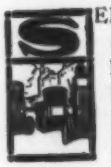


The Governor-Control Arrangements, Showing Load and Speed Valves, and How Attached to Motor

are provided with swivelling and chain adjusting arrangements at their forward end, and are deepened as they run backwards, so as to afford fulcra for the rocker shafts of the brake levers passing into the brake drums. Except for the two channel cross members carrying the engine, the entire frame is cross-stayed by tubular members with the addition of two solid crossed tie bars over the back axle. Beyond this and the fact that one end of each spring is free to move longitudinally in guides secured to the side frames, little more need be said, the illustration sufficiently bearing out the general features of a notable British vehicle.

According to municipal licenses granted in Buenos Aires during 1912 there were at the beginning of this year in that city 2921 private motor cars, 1691 hired passenger automobiles, 116 trucks and 129 motorcycles.

A QUICK TRANS-LOADING SYSTEM



SEEING that transport is a vital essential under modern conditions of life, it is remarkable how little has been done to co-ordinate its various branches so as to make the one type of transport help the other. This is particularly true of the development of the commercial automobile, and though its possibilities for acting as a feeder to the railroad systems have been obvious from the very first, in no country has any serious attempt been made to inquire into the advisability of modifying the mercantile motor truck to existing railroad requirements.

Adapting Motor Truck to Railroad Conditions

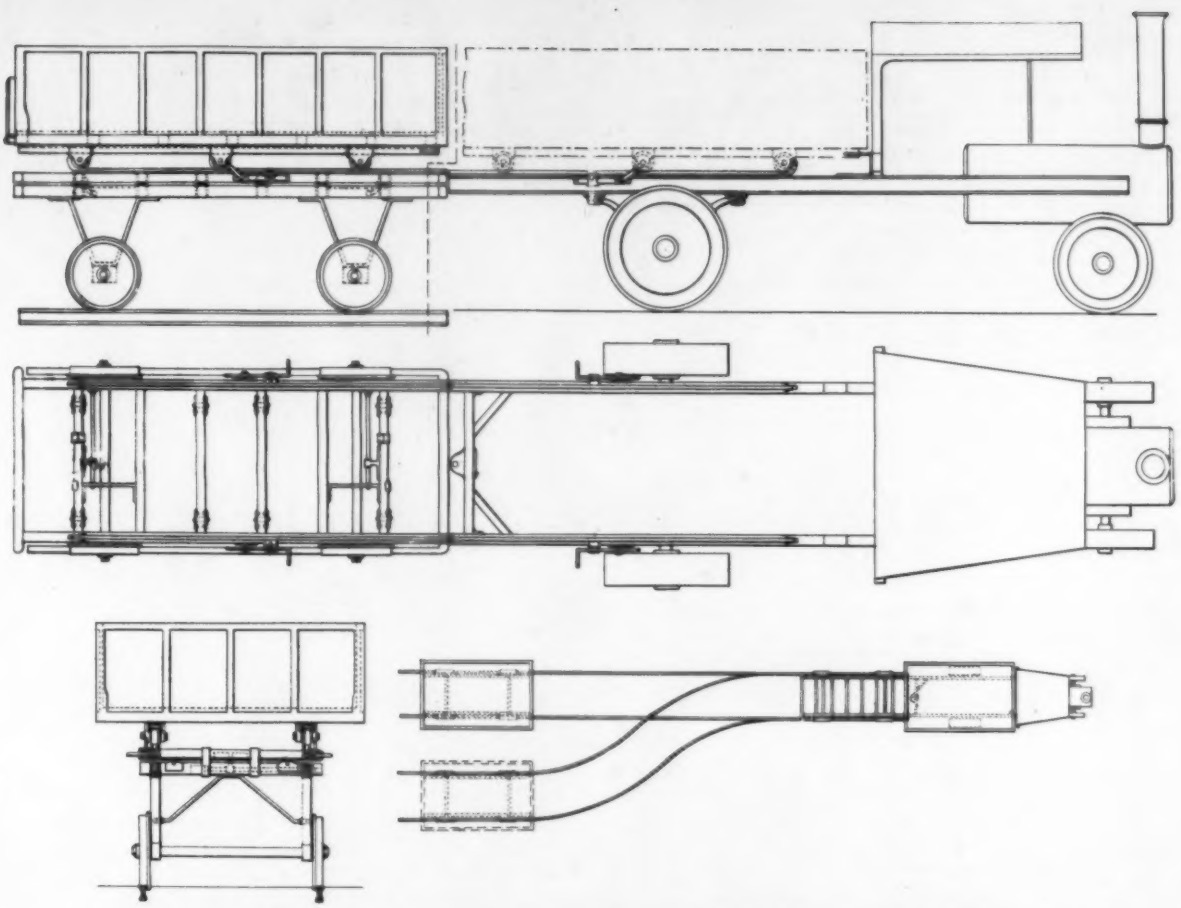
In many cases, little or no importance has been attached to the height of the loading platform of the truck in relation to the loading stage at the freight depot, and few, if any, attempts have been made to shorten the time of loading at that depot.

Under existing circumstances, one of the best methods for tackling the problem of transshipment from rail to road is that which has just been brought out in Great Britain by Montague Smith, managing director of a very considerable co-operative coal undertaking. In this, apparently no attempt has been made to afford a method of transshipment direct from freight car to road wagon; the difficulties of doing so with most of the existing rolling stock has been frankly recognized. Nor is this direct transshipment always possible; take coal for instance, which in London has to be put into sacks before it can be delivered retail—this by law.

The System Described

Montague Smith employs what are practically removable automobile bodies running on rollers; these run with their rollers on rails laid along the loading stage, with turntables where necessary. In such a case, the body can be loaded direct from the freight car, and run straight on to the automobile truck waiting at the end of the stage.

Loading in a yard, however, in other words, from the ground, the difference in level has to be faced. Consequently, the detachable body is placed upon a trolley to bring it the same height as the top of the automobile truck frame. This trolley runs on light rails flush with the ground, and as soon as the motor vehicles back up to the end of the switch track, the trolley is run forward, so that the ends of the rails on it, along which the body is run, if possible, come dead up against the end of similar rails on the road wagon. If not, however, a



Drawing Showing the General Arrangement of the Montague Smith Removable-Body Loading System

traversing screw can soon bring them into line. A catch is released, and the body is then run from the trolley on to the motor truck. As soon as it gets to the end of the rail, the front roller automatically brings into action a catch which sprags the second pair of rollers, holding the body firmly in position as shown in the drawing while a further device can be operated by the driver from his seat, so as to hold the body still more firmly in position.

Some Actual Figures of Time Saving

Two or three months ago in an article in the COMMERCIAL CAR JOURNAL, the writer laid stress on the importance of the detachable and spare body to keep the vehicle and its driver idle as little as possible, and the following actual figures obtained by Mr. Smith from data covering six months' experience, emphasize the point more strongly than ever.

With a motor wagon and trailer, carrying together 10 tons, and delivering coal from house to house in 2 cwt. sacks, the average daily mileage was 24; the amount delivered in the day, 30 tons. At this work it gets through three loads a day—averaging 10 miles around—the time occupied in loading in each case averaging 2 hrs. 10 min. Thus, the machine was idle 6½ hrs. each day loading. With the new trolley device the load was transferred from trolley to lorry in 4½ min. and a loaded trailer picked up in 1½ min.—6 min. for each load. In other words, 18 min. as against 6½ hrs. for the day. Besides the saving in automobile time, the saving in handling the possibility of sufficient time to load carefully, the release of freight cars without demurrage, and the ease of checking out the freight are all points in its favor. Perhaps, in its present form, it is not the best system possible, but it certainly offers vast improvement, especially in handling smaller quantities of stuff expeditiously in country districts.

Mr. Smith, the inventor, I understand, is open to negotiate about the American rights of the patent covering his system.

Reference has already been made in these pages concerning the Congres National des Transports, which held its first meetings in January last. As a result of those meetings, the "Syndicat Generaldes Transports Publics par Automobiles de France" has been informed to consolidate the interests of such transport services, and to focus those interests. According to a preliminary report already issued automobile transport services in France are represented by 293 different services covering a total distance of 8842 km. These have been classified under

1. Permanent services uniting different localities. These number 129 services covering 3463 km.

2. Permanent services acting as railroad feeders. There are 47 of these aggregating 1193 km.

3. Services operating only a part of the year. There are 70 of these, representing 2869 km.

MOTOR SPIRIT FROM SCHIST

THE high price of gasoline is making itself felt all over Europe, and in every country search is now being made for some substitute. According to M. L. Ventou-Duglaux writing in *Le Poids Lourd*, in France the more extended use of a spirit distilled from bituminous schist has been suggested, and from its known characteristics this appears to offer some possibilities, which, however, are limited by output considerations. At present, this bituminous schist is produced chiefly in the south of France, and on distillation gives off spirits ranging from .715 to .750 density, the lightest spirits having a boiling point from 75 degrees to 120 degrees C, while the heavier range from 90 degrees to 150 degrees C, and beyond this what is known as French petrol at a density of .805 is also abtained.

The production of the bituminous schist has fallen of late years from about 210,000 in 1890, to 124,000 tons at the present, and a cubic metre can produce from 8-9 litres of heavy oil costing 11 frs. to the hectolitre. It is from this oil that the spirit is distilled.

Ever since December, 1910, the house of Thelots et de Margenne has run a 5-ton Berliet wagon on this fuel, while they have been working another on it since October, 1911, besides a 3 tonner from December, 1912, and all these have given satisfactory results. The Societe Lyonnaise have also for a long time past satisfactorily run their wagons on it. Its use in carburetors of the ordinary type presents no difficulties, but careful air regulation is necessary. Also there is nothing to fear from deposits of carbon in the cylinders.

As regards price, schist spirit compares favorably with gasoline, .715 spirit fetching 42 frs. the hectolitre, while .750 is at 34 frs. The chief trouble is limited production. In 1912, the Societe Lyonnaise only produced 80,000 hectolitres of crude oil, representing only about 4000 hectolitres of spirit.

WHEELS AND ROAD SURFACES

In a paper that Col. Crompton read before the British Institution of Automobile Engineers, the adoption of comparatively small wheel diameters on steel tired vehicles was deplored, and it was stated that at the relative speeds at which steel and rubber tired vehicles were run, the steel tired wheel should be at least three times the diameter of the rubber tired one carrying the same weight, if both were to be equally fair on the road surface. At present, however, makers have adopted practically the same size for the steel as for the rubber tired wheel, namely, 40 in.

The author further expressed the opinion that the surfaces of roads are now in a fair way to be rendered sufficiently elastic to stand up to the destructive forces to which they are opposed, but few will probably agree with his opinion that the increased elasticity introduced into their surfaces during the past 8 years has been the chief factor in reducing mud, dust and noise of travelling. Most people will put it down to a decrease of horse traffic.

Col. Crompton made many references to American practice in road construction, especially in the use of artificial asphalt.

THE DUTCH RELIABILITY TRIALS

LATEST advices rather go to show that the Dutch commercial car reliability trials, which began April 16, were not an unmitigated success, owing apparently to poor organization. Presumably, an important result of such events is the publicity which they bring, yet no arrangements appear to have been made to blazon forth to the world what might have been an important trial. The result was that in several of the towns passed through, the competing vehicles were wholly unexpected, and practically wherever they were placed on view, the attendance of sight-seers was poor.

There were other muddles, too; for instance, the route was mapped out over bridges unsuited for carrying such heavy machines, with the result that the timber structures had to be strengthened, while endless annoying difficulties were encountered at other bridges. Then, too, in many places the roads and market places where the vehicles were parked for the night were incapable of carrying such heavy weights, and cases of vehicles sinking in and having to be hauled out were far too frequent—though in extenuation it must be admitted that the rain made the roads very soft, and some of the competing vehicles were of a size quite unusual on European highways, the big Mulag alone accounting for 11,000 lbs. of useful load.

Though the trials nominally began on the 16th, they did not actually start from Amsterdam until Friday, 18th. Wednesday was given over to preliminaries; Thursday to an exhibition of the vehicles. Out of the 24 entered, 23 started, the Panhard-Levassor which failed to arrive in time, joining the procession at Enschede.

Taken all round, the vehicles entered give a very good idea of European practice, but beyond this and the mistakes made in organization, these trials did not appear to carry any particularly instructive lesson.

Although the annual trials of commercial cars in France are yet two or three months distant, certain general particulars are already available. According to these, an innovation is to be introduced in running them over a big 18 or 20 stage circuit instead of starting daily from Versailles as hitherto, and the route will probably lie from Paris to Lyons, Clermont-Ferrand, Bordeaux, Angouleme, Tours, and probably by Orleans and the banks. This itinerary will take the cars through every district where the manufacture of the commercial automobile in France is carried on to any extent.

Tests in Italy with small heavy oil engines not having proved satisfactory as was hoped, various automobile and agricultural bodies in that country are arranging to hold a series of trials for such prime movers, the tests being essentially, however, for small engines which are not to be of more than 30 h. p., while preference will be given to those below 8 h. p.

Probably the biggest fleet of commercial cars ever gathered together was that for the Italian army in Tripoli, which for a time when they were disembarked in Africa, were all assembled together to the number of 2000 automobile trucks.

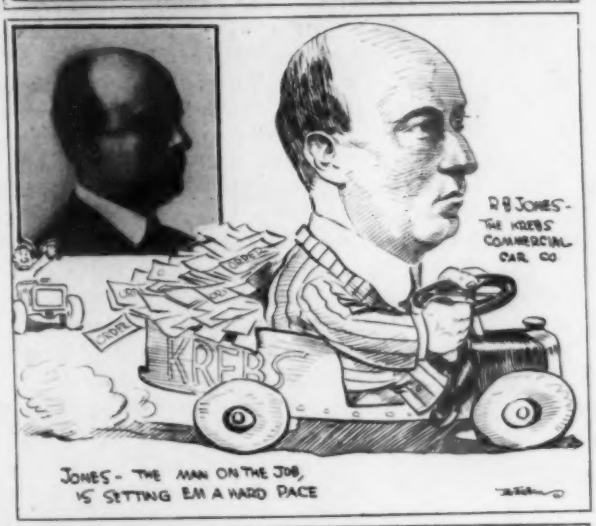
The truck will increase your efficiency

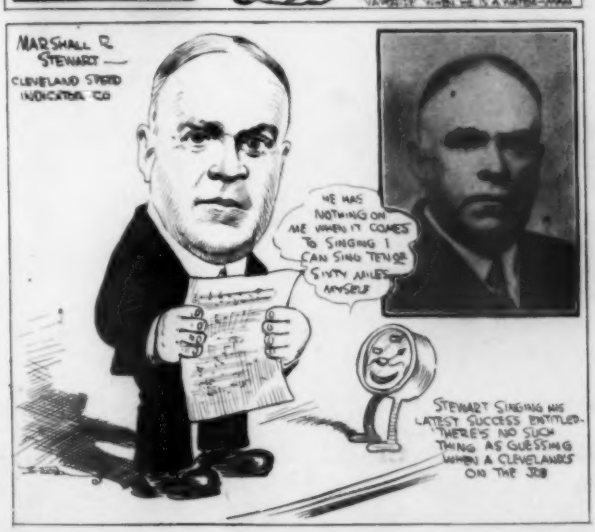
CCJ GALLERY of SALES MANAGERS

HALL OF FAME
DRAWN FROM TELEGRAPHIC DESCRIPTION
MODEL K
WW NEVINS- ATWATER-KENT MFG. WORKS
YOU HAVE TO HAND IT TO BILL NEVINS—HE PUTS 'EM RIGHT ON THE MAP

SALES TALKS
J.H. SHIELDS. WILCOX MOTOR CAR CO
HOME RUN SHIELDS- HIS AVERAGE PUTS TY COBB AND THE REST OF THEM IN THE BACKGROUND...

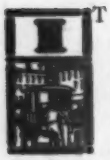
TO KING GASOLINE
AVANT! BOLD TYRANT, BEAT IT.
HERE COMES THE BOLD CRUSADER
HE'S GOT YOUR NUMBER; SO GIT
BACK UP TO THE TALL TIMBER.
LONG ENOUGH YOU HAVE HELD YOUR SWAY
YOU'VE BEEN GABBING, MISERLY AND MEAN,
GOOD NIGHT, TA-TA, JUST FADE AWAY
FOR NOW WE'LL ALL USE KEROSENE
G.C VAPORIZER
ARTHUR WATERMAN- THE G.C VAPORIZER CO OF AMERICA
"ART" WATERMAN IN HIS SUCCESSFUL IMPERSONATION OF THE CRUSADER.
P.S.- SOME BOOB ASKS- HOW "ART" CAN VAPORIZE WHEN HE IS A WATER-MAN!




MARSHALL R. STEWART— CLEVELAND SPEED INDICATOR CO
HE HAS NOTHING ON ME WHEN IT COMES TO SINGING! I CAN SING TENSE SIXTY MILES MYSELF
STEWART SINGING HIS LATEST SUCCESS ENTITLED- "THERE'S NO SUCH THING AS GUESSING WHEN A CLEVELANDER ON THE JOB"

Retail Hardware Dealers Find Commercial Cars Increase Business

Extracts From Letters Showing What Cars Are Doing



T is difficult to understand why the retail hardware dealers have not made more use of commercial cars. Hardware manufacturers and wholesalers have been very progressive in the use of motor driven trucks. One need but visit New York, Chicago, Milwaukee and Philadelphia, or any of the large cities, to see plenty of three-ton trucks in use by the manufacturers and wholesalers of hardware. The retail dealers, however, have been somewhat backward, although commercial cars undoubtedly can show a saving over horse methods in the delivery of retail hardware, as will be seen by some of the examples herewith cited.

One of the requirements of the hardware dealer is a body which can be protected to prevent tools and parts from the weather, and yet a body which can be readily loaded and unloaded. They also require a body which will permit of carrying long pipe and stock, which is actually longer than the vehicle itself. The first of these conditions is usually cared for by the use of tops fitted with side curtains or other means of quickly closing in the body. Panel bodies are also used for certain classes of retail delivery, but as a rule the bodies are more or less open. To care for long stock and pipe the floor boards are even extended beyond the vertical sides of the body, the pipes resting on this and project outside of the driver's seat, and even well forward of the hood and radiator. In some of the smaller vehicles the floor space is all made available by removing the gasoline tank from its usual position beneath the driver's seat, and placing it in the cowl of the dash. Thus the floor beneath the seat is available.

Retail hardware dealers are using not only large trucks, but some very small ones; for instance, the Hardware & Supply Company, of Chicago, Ill., are using a little Mercury truck, made by the Mercury Manufacturing Company, of that city. They say "it does the work of three horses which we used before for the same work. In fact, we could not profitably do business and deliver goods so far from our store, with the horses as we do now easily with the car. We receive many 'phone orders for work or for goods from patrons as far north as 31st Street, that we would not receive was it not known that we have a delivery car for quicker service.

"It cost us nearly $60 per month to maintain the three horse delivery service last year, besides the man's salary to care for the rigs. Five dollars per month has maintained our car service. This is an estimate. The expense has been nothing aside from the cost of oil and gasoline, so far. Anyone of the clerks in the store run the car, as well as ourselves.

"Every hardware merchant, especially if he does jobbing in metal work, should have a car. So much time can be saved in getting work and material to and from jobs. A customer is quick to see this. At the present price of wages customers don't like the idea of paying for too much time going and coming. We are living in a fast age and quick service is a necessity."

Cares for Twenty-five Per Cent Increase

The J. B. Kendall Hardware Company, of Washington, D. C., are using a Witt-Will truck, which has the motor under the floor boards, permitting of a short wheelbase. At the same time this easily carries bars in lengths of 20 ft. It has replaced two double teams of horses, and in addition is now caring for a 25 per cent. increase in business.

W. M. Goldenblum & Company, hardware merchants of New York, have been using a two-ton Sternberg truck for over a year. This truck has replaced three wagons, and the expense of operation has been less. They are now planning to put on another truck of the same make.

Trucks Save Fifty Per Cent

The H. Pfeiffer & Son Hardware Company are using an Ideal truck which averages about 42 miles daily, and are making nine miles to the gallon, and 250 miles to a gallon of oil. It is used for city deliveries, and has taken the place of one two-horse and one single horse wagon, and as usual it also cares for the increase in business since it was put on. The loads vary from 1000 lbs. to a ton and a half. Much of the service is delivering hardware to the new houses which are being built, and as most of these are in places where the streets are unpaved, the truck sees some pretty rough going. On account of this work the company hesitated to purchase the truck in the first place, but are very much pleased to find that they have had no serious difficulty in getting through the unpaved streets.

The records show a total expense, for gasoline, oil, storage and repairs, of $148.75. The firm pays $6 a month for storage of the automobile truck, but they formerly paid $18 per month for each horse. This didn't include any veterinary bills or any repairs to the wagon and harness. Prior to the time the automobile truck was purchased the expense for deliveries was not so carefully kept track of but as nearly as can be estimated from the amount paid for feed and keeping of horses and repairs to horse and wagon the work is now done at 50 per cent. of the former cost, besides which the firm now employ but one man to do the delivery, for which two men were needed during all the time in the busier season, and most of the time throughout the year. One of the most important points not to be overlooked is the satisfaction to the customer through quicker deliveries which the firm is often able to make which was not possible with the teams.

Truck Meets Boats on Scheduled Time

The Donohue Hardware Company, of Sandusky, O., have been using for the past year a Sandusky truck. This has replaced their horse-drawn vehicles, and is taking care of business which they could not care for without it. This is particularly true of the boat trade to the Lake Erie Islands. The Donahue people were unable to make their city deliveries and have time to meet boats carrying stock to the Islands. After purchasing the truck, they have been able to greatly increase their business, not only in Sandusky and nearby towns, but also to take care of the Island trade.

They say: "Other than three tire punctures, we have had absolutely no trouble—due, in part, we believe, to the carefulness of our driver,—but, at the same time, quite a testimonial as to the efficiency and durability of the truck.

"We believe it has actually increased our business in that it has enabled us to make deliveries which would be impossible for us with a horse."

The Plimpton & Hill Corporation, Hartford, Conn., are using a Pope-Hartford three-ton truck, which ever since it was put on has been doing the work of five horses and with greater efficiency and satisfaction, as well as saving time and money. They say:

"Our work has been such that a machine is compelled to go on many streets that have just been cut through and into the grounds of new buildings, through mortar beds, piles of bricks, etc., which has given the machine a very severe test and it has acted much better than we expected.

"The driver being over the motor, can see the condition of his road at all times and has a better command of the situation in congested traffic than he would have placed closer to the ground. Our driver can stand, facing the rear of the truck and drive his machine backwards between other trucks, teams, or into a narrow alley with one motion which is a saving of time, also wear on the machine. We think that a load is distributed more evenly on this type of body than on the other, and there is sufficient weight on the rear wheels to allow traction enough to move all loads that the machine can carry over up grade or through bad roads.

"This machine has displaced five horses which cost $1 per day for feed for each. The truck has averaged an expenditure of 87½ cents per day for oil and gas. We have had no trouble from breakages and very little delay aside from what would be caused from adjustments required on a new machine. We have come to the conclusion that after securing a good driver and insisting upon his keeping the motor and pan clean and giving him a little time each day, or once a week to do this thoroughly, the truck will not owe us anything at inventory."

The importance of the driver to any user is shown by the experience of Smith Brothers Hardware Company, of Columbus, O., who say as follows:

"We had hard work getting a good mechanician and driver combined, with the result that we had large repair expense. After a year's experience we got men who knew how to run and care for a truck, and since then we have had good service; and for long hauls it is economical as compared with horse-drawn trucks. The life of a truck is not over five years; and four years is about the average life of a truck. Counting depreciation and running expenses, it costs about $60 a week to run a two-ton truck. But one truck will do more work than two teams. It costs about $35 a week for team with one man per team. The Vonnegut Hardware Company, of Indianapolis, Ind., are using Waverley electric trucks with great satisfaction. They say:

The Mercury Delivery Wagon
A typical small truck used for hardware delivery

G. V. Electrics, One of Which Has Been in Service For Eight Years

"We regret that we did not keep up our record of costs after we found that, as a general proposition, the substitution of machines for horses proved advantageous.

"We are using two Waverley trucks; a Premier, and a Marmon for general deliveries. We are still using the horse and wagon for depot work because of the cramped conditions there, and for short hauls.

"Because of the very satisfactory service they enable us to give, we could not be induced to exchange our power trucks for horse-drawn vehicles."

Used Truck Eight Years

Hammacher-Schlemmer & Company, of New York, are using electrics of G. V. make. The fleet now consists of two 3 ½ ton, two 3 ton, one 2 ton, and one 1 ton truck. They have had a 3½ ton in use since June, 1911, and the other since June, 1912; one 3 ton has been in use since December, 1904, and the other since July, 1907; the 2-ton truck has been in use since June, 1912, and the 1-ton truck since September, 1910.

The trucks cover from 20 to 35 miles per day on the different routes, and the 3½-ton trucks are guaranteed to run 40 miles on one charge. They also find the electric truck average as economical as the horse trucks, and besides making nearly twice the mileage, enable them to make deliveries which they could not handle before the adoption of the electric trucks.

They say: "We have figured out that a 3-ton truck costs $9.56 per day. This includes wages of driver and boy, garage, current, batteries, tires and miscellaneous supplies and repairs.

"The method we adopt for depreciation is as follows: Interest on investment 6 per cent., insurance 8 per cent., depreciation 12½ per cent. By this you will see that the truck bought in 1904 was taken in December, 1911, at one-eighth of its original value, and on December, 1912, which was its eighth year, we took it off our books, so that we figure the life of a truck of this kind about eight years. The cost, including these items, amounts to $12.48 per day.

(*Continued on page* 58.)

Papers Read During the S. A. E. Meet

(*Continued from page 16*)

JACKSHAFT VS. DOUBLE REAR WHEEL BRAKES

BY ARTHUR M. LAYCOCK

AN investigation from a designer's outlook on the following lines may prove instructive:

(1) Danger of breaking through any intermediary and not direct.

(2) The detrimental effects of brakes on end of jackshaft.

(3) Effect on universal joints and differential gears.

Our government in its specifications for army trucks has without any question taken the right step in insisting on both brakes being on the rear wheels. This must have a beneficial effect on the trade in general. Similar enactments should be made in all our large cities to save property and life in congested streets. The London Scotland Yard authorities, who are represented by a capable and efficient board of engineers, now insist that all motor 'buses and public service vehicles have both brakes fitted to the rear wheels. Each of them must be mounted independently; in other words, if both brakes are internal there must be two separate drums to each wheel, and two separate sets of bolts. These exactions may seem to the average engineer most severe and quite uncalled for, but one may stand on the curb in London and see one of the 'buses with 34 passengers bear down on the traffic at over 20 miles per hour and have to stop at a moment's notice. Experience has shown that a London 'bus driver does not make any allowance for a faulty worn-out chain. His judgment is remarkably good as to the varied conditions of the traffic, but circumstances that will not enable him to make a second grab at his hand lever continually confront him; in the meantime the inevitable has happened.

Imagine New York and Chicago motorized, the average speed changing from 3 to 12 miles per hour. Not only capable brakes, but proper location as well will be insisted upon. The reaction due to the frictional force on the brake surface should be as close to the road wheel as possible. Obviously, the closer the point of application of the braking force, and the point of its final reaction, the fewer the parts subjected to strain, which means not only a minimum number of breakdowns, but the greatest possible safety to the operator and the public at large.

It is equally objectionable to brake through the bevels, spur gearing double reduction gears, and the worm drive as applied to heavy vehicles; in fact, in these constructions it is not only dangerous in the extreme, but absolutely wrong when one considers the enormous strain of a reversible nature coming from the rear wheels when the propeller-shaft brake is locked. Of course, most engineers will say that it is easy to make these parts heavy enough, but the writer cannot see the logic of adding this unnecessary weight, and, at the best, you have an uncertainty with every unit between the brake and the road wheel, which in some constructions is quite alarming, no matter what proportion, material or treatment these parts may have. In taxicab service, particularly in New York City, the propeller-shaft brake, which is so popular in Europe, has practically been discarded for both brakes on the rear wheels.

Whatever may be the status as to brake location on the pleasure car, there is no comparison between the energy stored up in a 6-ton machine and the heaviest of pleasure cars. In case of collision at a given speed the disastrous possibilities of brake failure are more pronounced in commercial than in pleasure car work.

Detrimental Effects of Brakes on End of Jackshaft

Most designers, I believe are influenced by the popular trend, forgetting their own figures in a desire to give not what is cared for, but what is easier to obtain. Both brakes on the rear are more difficult to design efficiently. One has only to notice the diagram below to see the disastrous effects a jackshaft brake has on the bearings, shafts, etc. Engineers, who have really had the courage of their convictions and put in sections to correspond with the forces, have finished with tremendously heavy constructions, leaving the impression that they were inclined to be nervous about the jackshaft ends and careless with the real thing; in other words, dismantle from one of our best trucks a jackshaft with brake thereon and you will be struck very forcibly with the size of the outer ends as compared with the bevels, which are the real weak point in a good many designs, particularly where heavy engines are used and only a four-pitch bevel. Startling as the figures below may appear to be these facts remind one that perhaps they are nearer right than one would think if guided by the figures only.

Where semi-floating construction is used, which is preferable in the writer's opinion, on account of being able to use a much smaller sprocket and put the grief in the chain instead of in the delicate differential gears and drive shafts, the combined bending and torsion at the end of the jackshaft calls for a diameter that is very rarely taken care of properly. Many designers have the opinion that you can take a pleasure car axle and use it as a jackshaft. That is all right if jackshaft brakes are not used, the conditions then being analogous to pleasure car work so far as the jackshaft ends are concerned; in other words, you can never impose strains greater than the full torque of the motor. But with the jackshaft brake you may exceed this from two to three times; the larger the truck the more pronounced, of course, is the difference. Figures based on a 6-ton truck are so glaring in this respect that the outer ends must be so large as to be out of all proportion to the rest of the truck.

Take, for example, a 6-ton truck, 50 per cent. overload, 80 per cent. on the rear, which would be equal to about 10,000 pounds on each wheel; 40-inch rear wheel diameter, sprocket diameters, 6 inches and 22 inches, countershaft brake drum diameter 12 inches, and co-efficient of friction between the road and the tires 75 per cent.

Considering the jackshaft brake first.

The pull on chain =

$$\frac{10{,}000 \times .75 \times 20}{11} = 13{,}650 \text{ lbs.}$$

The horizontal component of 13,650 lbs. = 13,300 lbs.

Reaction on fulcrum pin A =

$$\frac{13{,}300 \text{ lbs.} \times 3}{6} = 6{,}650 \text{ lbs.}$$

Plotting the above forces—Fig. 1—the resultant reaction on the sprocket bearings is 19,950 lbs.

The distance from the center line of the sprocket to the center line of the sprocket bearing being 3½ inches, and the distance from the center line of the sprocket bearing to the center line of the countershaft 20 inches—Fig. 2—the total load on bearing is equal to

$$\frac{19{,}950 \times 3\frac{1}{2}}{20} + 19{,}950 = 23{,}445 \text{ lbs.}$$

Considering a motor of 50 horsepower, 1000 r. p. m., with a 12:1 reduction, that is 4:1 in the bevels and 3:1 in the transmission, we obtain

Pull in chain required in driving =

$$\frac{50 \times 63{,}000}{83 \times 2 \times 3} = 6{,}300 \text{ lbs.}$$

You will notice that in the double rear wheel brake construction it is utterly impossible to impose any load whatever of the jackshaft ends except, of course, the reaction from the radius rods, which can be taken easily direct on the frame. The figures given undoubtedly account for the many failures as well as for the exceptionally large brackets used by some. Almost 12 tons is quite an item to take care of. It seems perfectly absurd to introduce these strains on the end of the jackshaft and more than double the work on the chain. Where pleasure car axles, with brakes attached, have been used for jackshafts there has been more or less trouble. The bearings, tubes and driveshafts are subjected to stresses they were never designed for.

In the above paragraphs I have endeavored to demonstrate conditions the jackshaft brake imposes on the surrounding parts. This has not been considered by any means from every angle, but sufficiently, I think to show the superiority of the double-brakes-on-the-rear over the jackshaft brake design. It is manifest that the

wheels are the only place for the brakes, spelling finality in design as to their location, unless dependability and cost be sacrificed in the extreme.

Effect on Universal Joints and Differential Gears

In making a diagnosis of the situation pertaining to propeller-shaft brakes, the same questions may be asked and like answers returned as in the case of jackshaft brakes. The question may be raised as to the propeller-shaft brake eliminating to some extent the tendency of skidding. This, of course, opens up a very debatable question upon which few engineers agree. I think there is not much to choose between braking through the propeller-shaft and both brakes on the rear provided with a differential brake rock shaft; whether we take the conventional differential and differentiate by resistance, or take one which equalizes to velocity, the car will most certainly have the same tendency to skid if the co-efficient of friction for each wheel on the road varies. It is obvious that the durability of joints and gears must be sacrificed with the propeller-shaft brake, and I am sure that a good equalizer on the brake rock shaft with double brakes on the rear wheels leaves nothing to be desired so far as side skidding is concerned, some of our largest makers having always retained this construction. The excessive wear and ultimate failure of universal joints subjected to the reversible strains are easily accounted for. The unit pressure per square inch in most of the joints is exceedingly high. In fact, it is quite ordinary practice to work at 3000 lbs. per square inch. This figure is almost the limit and necessitates forced lubrication in some constructions. Nothing but hardened steel on bronze or hardened steel on hardened steel will stand this. Happily these loads are only momentarily applied. I have recently found that one of our leading and successful parts manufacturers recommend power transmission on their joints equivalent to 4400 lbs. pressure per square inch with a reduction of 3:1 in the transmission. Imagine the results when you increase the pressure 200 per cent., which again is putting things rather mildly as compared to what actually occurs with our heavy limousines and worm-driven trucks.

The replacement of joints, however, is not so expensive or troublesome as the repair of broken differential gears. Precisely the same theory holds good here; most of our differential gears are working under exceedingly high pressures. In fact, it is quite common practice to work at from 75,000 to 100,000 lbs., the stresses being the resultant of the full torque of the engine and the reduction in transmission. The steel used here will probably range from 100,000 to 150,000 lbs. per square inch elastic limit. Very few makers have a greater factor of safety than 2:1. These parts are also subjected to the same 200 per cent. overload from the rear, which

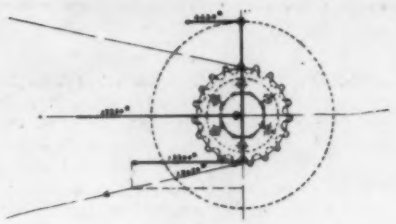


Fig. 1.

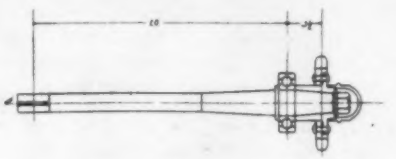


Fig. 2.

you will admit must be a pretty warm place for gears already stressed to 100,000 lbs. per square inch from engine torque alone. Considering that these extreme loads are of a reversible nature, it is very surprising the gears stand up at all, speaking well for the grade of steel used and the particularly fine heat treatment obtained in our large factories.

The drive-shafts are usually stressed very high, even in the full-floating type. In the semi-floating construction the combined bending torsion is very rarely taken care of adequately, figuring from the road wheel end, whereas it may be quite safe as to taking the torque of the motor only. Take, for example, a 5-ton worm-driven truck, of approximate weight with body of 8000 lbs.; figuring 25 per cent. overload and 80 per cent. on the rear, which in round figures comes out 8000 lbs. per wheel; using an engine of 4⅞ inches by 6 inch, four cylinders, which will develop 47 horsepower at 1000 r. p. m.; reduction in first gear 377:1, and a ratio of 8:1 in the axle; the diameter of the propeller-shaft 1½ in. and diameter of rear wheels 40 inches.

The torsion moment in propeller-shaft from the engine on low gear would equal

Of course, the question might be brought up that under this load of 20,000 lbs. there

$$Mt = \frac{47 \times 63{,}000}{265} = 11{,}300 \text{ inch-lbs.}$$

The torsion moment in propeller-shaft from road wheels equals

$$Mt = \frac{16{,}000 \times 20 \times .75}{8} = 30{,}000 \text{ inch-lbs.}$$

Stress in propeller shaft from engine =

$$\frac{11{,}300 \times 5}{1\frac{1}{2}^3} = 16{,}700 \text{ lbs. per sq. in.}$$

Stress in propeller shaft from road wheels and propeller shaft brake locked =

$$\frac{30{,}000 \times 5}{1\frac{1}{2}^3} = 44{,}009 \text{ lbs. per sq. in.}$$

Tangential pressure on teeth =

$$\frac{11{,}300}{1.5} = 7{,}420 \text{ lbs. on low gear.}$$

Tangential pressure on teeth =

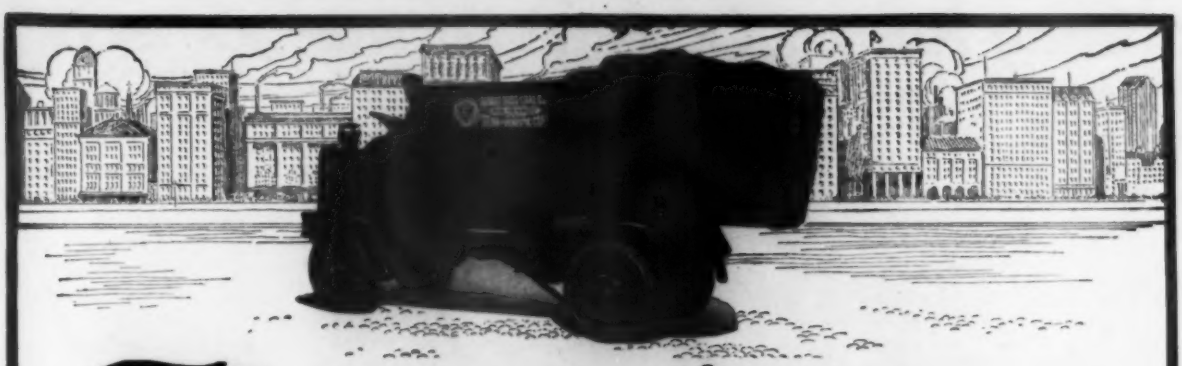
$$\frac{30{,}000}{1.5} = 20{,}000 \text{ lbs. from locked wheels.}$$

is no motion, the wheels being locked, but in mountainous country, I think you will agree with me, it is quite customary for a man to slide his wheels intermittently, and I am sure we can have considerable speed between the surfaces in contact and pressure very close to this. Many follow this construction in England at the present time, and it would be interesting to have our English friends' views on the subject. Where this design is used it undoubtedly speaks volumes for the dependability of worm gears as applied to heavy vehicles, considering they may be subjected to pressure from three to four times more than in the case of the double-brakes-on-the-rear-wheels construction. The high stress in the propeller shaft is quite easy to take care of, but it is mighty hard on joints. differential gears and bearings.

In making road tests of a new chassis, the brakes are one of the principal factors, and abused in an extraordinary manner with the roughest possible treatment. One can very easily imagine the anxiety of a designer of a propeller-shaft brake in comparison with one of both brakes on the rear. The former has the propeller-shaft, bevel pinion, ring gear, differential housing, differential gears with their bearings and drive-shafts in mind, while the latter is absolutely free from these considerations. In almost every item throughout the design of a chassis the engineer has in mind that the only way to obtain results is to cut down to a minimum the number of parts subjected to strain, or, in other words, to take the shortest distance between two given points.

The above discussion may be radical, but will seem quite in order to anyone who has handled an overload car in mountainous country, where an amateur will declutch and roll backwards for a considerable distance and then apply the brakes violently. An observer watching the manipulation of a robust jackshaft or propeller-shaft brake, coupled with a fierce clutch on a 25 per cent. grade, and the weight thrown on the rear wheels—as much as 80 per cent.—is led to surmise that the only logical design to stand abnormal shocks is the one involving the minimum number of parts subjected to the strains. To see a 6-ton machine under these conditions is an event not easily forgotten by any designer; words are inadequate to express the frightful abuse machines have to stand under the conditions enumerated.

The writer is absolutely unable to account for the propeller-shaft or jackshaft brake. There appears to be very much against them and very little in their favor.



Firestone

Notched Tread Continuous Base TRUCK TIRES

Let us show you records made by these tires in heavy service which put them in a class by themselves for mileage. Not an occasional "lucky" showing—but the average results obtained throughout the list of hundreds of users.

And when you understand the tire you will understand the records.

FIRESTONE RUBBER—toughness without hardness—most "cushion" with greatest wear resistance. Mileage—with most protection to Truck.

NO BULGE IN FRONT OF LOAD. Notched tread takes up traction wave. Therefore, no tread separation, no tearing away from the rim.

CONTINUOUS RUBBER BASE. No separate blocks to wear unevenly or tear out.

BETTER TRACTION. Notched tread grips pavement or road, no wheel spinning—gasoline saved. Also skids prevented.

These and other types of Firestone Tires, on Firestone Quick Removable Rims, are raising the standards of Truck efficiency and are reducing operating costs for business houses everywhere. Why not for you?

There are Firestone men near, at your service. Look in the telephone book.

THE FIRESTONE TIRE & RUBBER CO.

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio Service Stations Everywhere

This tire for heavy service—Single and Dual Tread

Write for Catalog Showing Many Styles for all Classes of Service

One of Those "Why Wasn't It Thought of Before" Things

When Writing, Please Say—"Saw Your Ad. in the C C J"

Fourth Report of Commercial Car Wheels Division

(Formerly Wheel Dimensions and Fastenings for Tires Division)

Note: This Report was adopted and now becomes recommended practice.

S. A. E. STANDARD MOTOR TRUCK WHEEL

Edges of Permanent Metal Felloe Band

WE recommend that the permanent metal felloe band be rounded on the two outside edges with radius not to exceed 1-16 in., and that one inside edge of the band have an angle of about 45 degrees, extending about 1-16 in. from the edge as shown in the following sketch:

Tolerance in Width of Permanent Metal Felloe Band

We further recommend that the previous recommendation as to tolerance in width of permanent metal felloe band be modified to read as follows:

	Plus	Minus
Tolerance in width	1-64 in.	1-64 in.

And, in consequence of the last mentioned above recommendation, that the previous recommendation as to the trueness of band when placed on surface plate be modified to read as follows:

Either side of the band when laid on a surface plate must not clear more than 1-64 in. at any point.

Tolerance in Circumference of Permanent Metal Felloe Band

In June, 1911, the Division voted that the tolerance in circumference should be:

	Plus	Minus
Before application to wheel	1-16 in.	0
After application to wheel..	1-8 in.	0

In February, 1912, the Division, in view of the then more extensive manufacture of rigid-base tires, recommended that the circumferential tolerance should be:

	Plus	Minus
Before application to wheel	1-32 in.	1-32 in.
After application to wheel	1-16 in.	1-32 in.

Both of these recommendations were accepted by the Society, the latter, of course, superseding the former.

In this connection the point has been made by wheel manufacturers that if the 1-32 in. plus tolerance be taken up in the manufacture of the band, the wheel manufacturer has left to him only one-half or 1-32 in. of his 1-16 in. plus tolerance in the application of the band to the wheel.

The first view of the Committee at its meeting of November 13, 1912, was that no change in circumferential tolerance should be recommended until a greater demand for such change should be evident. After a long discussion, however, upon motion, duly seconded, it was

Voted that the last mentioned above tolerance in circumference of permanent metal felloe band should be modified to read:

	Plus	Minus
Before application to wheel	0	1-16 in.
After application to wheel	1-16 in.	1-32 in.

Measuring Circumference of Bands

In measuring circumference of the band, if there is no allowance on the tapeline itself, a correction amounting to three times the thickness of the tapeline should be made.

Respectfully submitted.

Commercial Car Wheels Division

William P. Kennedy, Chairman
H. W. Alden
Joseph A. Anglada
H. D. Church
C. B. Hayes
A. M. Laycock
Jacques Morat
A. J. Scaife
Charles L. Schwartz
A. J. Slade
E. R. Whitney
Charles B. Whittelsey

Below is given a statement summarizing the recommendations made in all (including the above, the fourth) the reports of the Wheel Dimensions and Fastenings for Tires Division; in other words, a complete statement of the matter contained in the three reports already accepted by the Society, and representing a complete data sheet on the subject, if the recommendations contained in the above given Fourth Report are accepted by the Society.

Radial deviations must not occur at diametrically opposite points, and there must be no flat spots or kinks in band on finished wheel. Either side of band when laid on a surface plate must not clear more than 1-64 in. at any point.

Bolt Equipment for Side Flanges. All Bolts to be ½ inch Diameter

Outside Diam. bolt diam. tire hole circle	Number of bolts
26..... 18½	6, 9 or 18
28..... 20½	do.
30..... 22½	do.
32..... 24½	8, 12 or 24
34..... 26½	do.
36..... 28½	do.
38..... 30½	10, 15 or 30
40..... 32½	do.
42..... 34½	10, 15 or 30
44..... 36½	12, 18 or 36
46..... 38½	do.
48..... 40½	do.
50..... 42½	14, 21 or 42
52..... 44½	do.
54..... 46½	do.

Edges of Felloe Band

Band to be rounded on the two outside edges with radius not to exceed 1-16 in., and one inside edge to have an angle of about 45 degrees, extending about 1-16 in. from the edge.

Measuring Circumference of Band

In measuring circumference of band, if there is not an allowance on the tapeline itself, a correction amounting to three times the thickness of the tapeline should be made.

Note.—All of the foregoing summary, so far as pertinent, applies to metal wheels.

Wheel Dimensions for Solid Tires

Demountable and Non-demountable Rims.

SINGLE TIRES

Width of felloe and band .....¾ inch less than sectional size of tire.
Thickness of steel band .....¼ inch up to 4½ inch tire; ⅜ inch on 4½ inch and larger tires.

DUAL TIRES

Width of felloe and band .....Twice the sectional size of tire.
Thickness of steel band .....⅜ inch for all sizes of tire.

SINGLE AND DUAL TIRES

Sectional size of tire	2	2½	3	3½	4	
Minimum felloe thickness	1¼	1¼	1½	1½	1¾	
Sectional size of tire	4½	5	5½	6	6½ and over	
Minimum felloe thickness	1¾	2	2	2	2⅛	

Wheel Diameter Over Steel Band

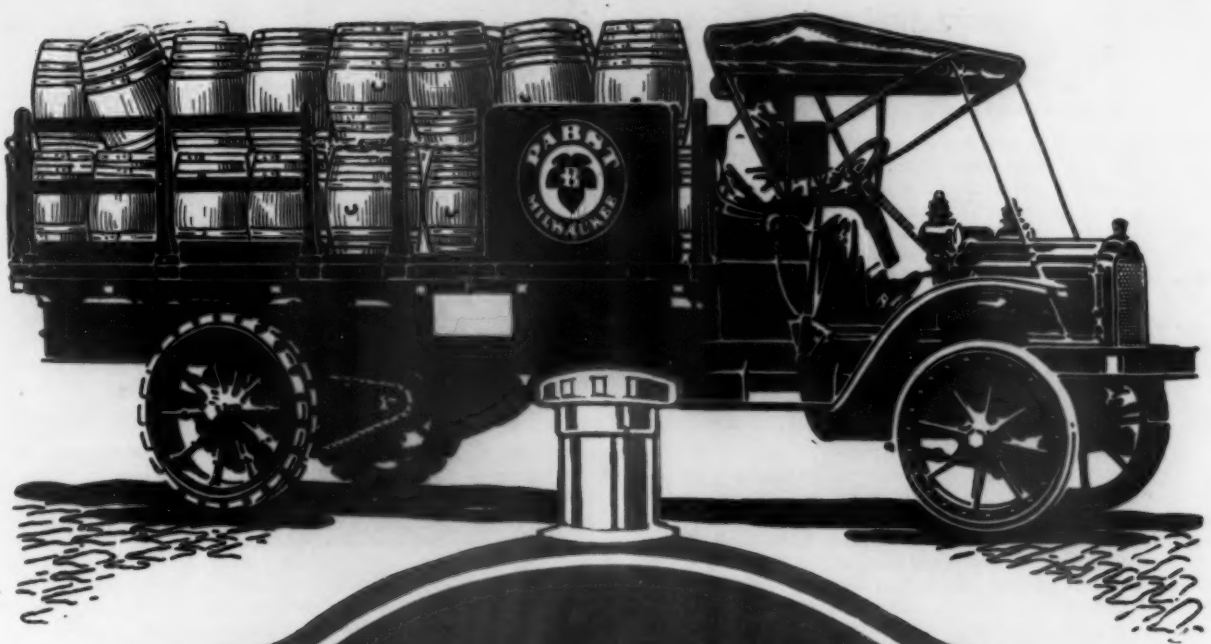
SINGLE AND DUAL TIRES

Nom. outer diam. of tires	30	32	34	36	38	40	42
Wheel diam. over steel band...	24	26	28	30	32	34	36
Exact circumf. over steel band; neglecting tolerance	75	25-64 81 13-16	87 3-32	31-32 94	1-4 100	17-32 106	

Allowable Deviation from Precision in Felloe Bands.

	Plus	Minus
Tolerance in circumf. of band before application	0	1-16 in.
Tolerance in circumf. of band after application	1-16 in.	1-32 in.
Tolerance in width of band	1-64 in.	1-64 in.
Tolerance of thickness of band	0.006 in.	0.006 in.
Tolerance in radius of band after application	1-16 in.	1-16 in.

Circumferential deviation from precise figure must be uniform across entire width of band.



EVERY WHITE RADIATOR

ONE MORE REASON

Watch the motor trucks go by.

Note what an impressive majority of the big houses have chosen the White Motor Truck as the best motor truck "buy."

Just count the motor trucks with the famous White radiator—shaped the same as the border of this advertisement.

Every White radiator you see is one more reason why you should consider the White for your next Motor truck purchase.

3500 White Trucks in Service Today

THE WHITE COMPANY

CLEVELAND

Manufacturers of Gasoline Motor Cars, Trucks and Taxicabs

CALCULATING DEPRECIATION OF COMMERCIAL AUTOMOBILES

BY CHAS. WHEELER
Member of Council I. A. E.

EPRECIATION has been defined as the diminution which takes place in the value of a wasting asset in spite of the amount expended on it in repairs, and there is no doubt that in assessing the diminution in value of commercial vehicles something more than the application of definite accountantcy principles is necessary. This is probably true as applied to all factory accounting, which in effect is dissection as opposed to combination, the usual operation of commercial accounting.

If exception be taken to this short paper on the ground that the subject treated is more of a commercial than of an engineering character, I would point out that the scientific keeping of accounts connected with automobile production and the running of automobiles is of vast importance, and necessitates expert engineering advice in nearly all departments. In fact, the engineering head must not only know what cost he is "up against" on the score of depreciation, but he must have a big voice in the determination of the governing factors.

The first factor to be considered is the estimated "working-life" of the automobile, and this depends very largely on the particular circumstances in which the vehicle is used. Thus a Maudslay motor 'bus runs some 700 miles per week, while a Maudslay stores van averages say 140 miles per week. Obviously, other things being equal, the length of the "working-life" must be considerably in favor of the stores van. The "working-life" also depends upon the quality of the vehicle, i. e., quality in design and manufacture, and is thus closely connected with the initial cost. The "working-life" further depends upon the condition in which the vehicle is maintained, and this in turn depends upon the driving and supervision, and the amount spent on renewals.

Having decided upon the estimated "working-life" L, the next step is to consider by what method the initial cost should be spread over the period decided upon—in other words how the depreciation should be written off year by year. Three methods at least warrant consideration, namely:

(1) To divide the capital outlay C, by the number of years at which the "working-life" L, is estimated and charge the quotient against each year's working costs.

(2) In the first year to write off a high percentage of the cost; in the second and succeeding years to write off the same percentage on the diminished value, that is, the balance left after deducting the previous year's depreciation.

(3) To divide the capital outlay C, less residual value, (that is, the estimated value R, of the vehicle at the end of its "working-life") by the number of years, etc.

In each method, renewals and repairs, as they occur, are charged against "general running expenses."

The first method cannot of course be recommended where any degree of accuracy is required.

The second method is perhaps financially the soundest if it be desired to ascertain from one's books the actual realizable value of the vehicle at any moment. Although this method gives a fairly true result in the end, it has the objection that in its earlier years the cost of the service is overloaded.

The third method, expressed by the formula $\frac{C-R}{L}$, where C = capital outlay, R = residual value and L = the estimated years of life, is that recommended as being the most practical and accurate method. The only observation necessary on this method is one dealing with the reconsideration of L at a later period. When the life of a vehicle is reconsidered, the unexpired capital outlay should be taken as the basis for the revised charge for depreciation. Thus suppose $\frac{C-R}{L} = \frac{500-50}{5}$, the annual depreciation being £90; by the end of two years the capital outlay would have been written down to £320. If the estimate of life be then revised and extended to seven years in all, with five more to run then $\frac{C-R}{L} = \frac{320-50}{5} =$ £54 annual depreciation.

Obsolescence is a factor which has to be considered, as it is by no means improbable that some combination of circumstances may render it desirable to dispose of a particular vehicle before it is really worn out. From a strict accounting point of view obsolescence may not be depreciation, but the factor is at least of sufficient importance to "round up" any percentage that may be determined by other considerations, and if, in the future, by perfecting the machines, their ordinary working life can be reckoned as longer than it is at present, obsolescence will become of more importance, for a machine which is still quite efficient mechanically may be rendered uneconomical by the introduction of improved types. When such time arrives it may be prudent to make provision under this head, which while not strictly proper to depreciation may very conveniently be connoted.

There remains one other detail for consideration, namely, the treatment of small additions to plant. The effective life of the additions may or may not be co-terminus with that of the vehicle, and any attempt to bring their depreciation within the scheme for the depreciation of the vehicle itself would cause complication which it would not be worth while to incur. The practice recommended is to regard such small additions as chargeable to maintenance, which, in effect, means writing them off at 100 per cent. in their year of purchase.

Retail Hardware Dealers Find Commercial Cars Increase Business

(*Continued from page 52.*)

Each Truck Averages Twelve Thousand Miles Per Year

The Warner Hardware Company, Minneapolis, Minn., maintains a motor delivery equipment consisting of two Wilcox 1½-ton trucks and one Flanders light delivery truck for the delivery of hardware to customers in Minneapolis and vicinity.

Each of these three trucks covers an average of 12,000 miles a year, and notwithstanding the heavy snows and cold weather of Minnesota, they are operated continuously the year around, except for the time it is necessary to put them into the shop for overhauling.

"We are delighted with the trucks for handling the bulk of the work," says Leon C. Warner, of the company. "While the expense of motor delivery is important, it is secondary in that we give service by having this equipment."

The motor trucks are loaded for delivery from a platform at the rear of the store. Regular hours have been established for departure of trucks from the store, and the delivery methods have been carefully systematized. Daily report sheets by the drivers giving itemized lists of the goods delivered serve as a check against merchandise being sent out and not charged, and other errors that are apt to creep into any business.

As before stated, the wholesalers and manufacturers are using trucks, but as we are here dealing more particularly with dealers, we will not go into details, except to say that such companies as the Simmons Hardware Company, and Henry Disston & Sons., etc., are large users of trucks. The latter uses both gasoline trucks of Alco make, and electrics of the Commercial Truck Company of America, and the Simmons Hardware Company has a large number of trucks of all classes and sizes. From the few brief examples given it will be seen, however, that there is a big field for the commercial car in retail hardware delivery.

WANTED—A FIRST-CLASS FIELD MAN FOR MOTOR trucks. Must show a record for producing business and give references in first letter. All communications confidential. Address "Campaign," care of this Journal.

"Use Kerosene as Fuel"

THE G. C. VAPORIZER

Has been scientifically tested by Mr. Robt. W. A. Brewer, the acknowledged British Carburetor authority. What he learned of its astonishing efficiency and economy ought to interest you.

ROBERT W. A. BREWER,
A. M. I. C. E., M. I. M. E., M. I. A. E., F. S. E.,
CONSULTING ENGINEER,
Automobile, Marine and Aeroplane Expert.

199 Piccadilly, London, W.

3rd June, 1912.

Telegraphic Address: "PLANIVOLAS, LONDON."
Telephone: GERRARD, 3128.

REPORT

The G. C. Vaporizer, Limited,
11 Hart Street, W. C.

Dear Sirs:

I have concluded a comparative test between Gasolene and Kerosene Oil, on a 30 H. P. Aster engine, the engine while running on Gasoline being under ordinary conditions, and fitted with a G. C. Vaporizer while running on Kerosene oil, with the following results:

1. The full load consumption in gallons was the same with kerosene as with gasolene, and rather less at partial loads. The improved running at light loads was due to the more perfect carburetion with the G. C. apparatus, as compared with an ordinary high-class gasolene carburetor.
2. Owing to improved carburetion, the heat loss to the cylinder walls is less than in the case of a gasolene carburetor and consequently the engine runs cooler.
3. For the same reason the flexibility and accelleration of the engine are increased.
4. There is no apparent carbon or greasy deposit in the engine as a result of using kerosene in the G. C. apparatus.

I have also run a 28 H. P. Straker-Squire lorry, weighing 3 tons, 12 cwt., to Brighton and back, fitted with a G. C. Vaporizer using kerosene, with the same mileage per gallon of kerosene as can be obtained from a gallon of gasolene in the ordinary gasolene carburetor. The lorry managed 95% of the road in top speed and only 5% in the second gear, proving that full power can be obtained from the engine.

The results of the above tests are clearly of such a satisfactory character that in my opinion there are very great advantages to be derived from the use of the Vaporizer, the cost for fuel being halved; it is easily fitted, has no moving parts to wear out, and requires practically no attention.

(Signed) ROBERT W. A. BREWER.

The G. C. Vaporizer completely overcomes every vaporizing and lubricating difficulty heretofore encountered in using kerosene. We absolutely guarantee its perfect service.

Correspondence is especially invited from motor vehicle manufacturers and users.

G. C. VAPORIZER COMPANY
OF AMERICA, Inc.

1790 Broadway, New York

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WILCOX TRUX

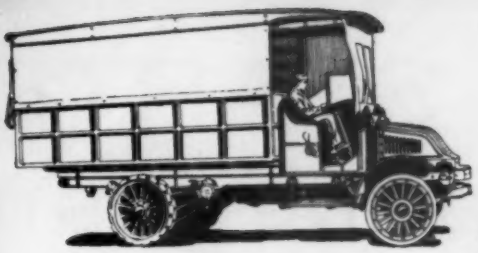
Stand For Efficiency, Economy and Trade Expansion

"Ask the man in the WILCOX CAB." 66⅔% OWNERS have REPEATED THEIR ORDERS, using from 1 to 22 WILCOX TRUX, because they give service, operate at less tire cost, gasoline cost, and maintenance cost than any other trux.

We have some territory still open for live representatives. Take the matter up with us today.

H. E. Wilcox Motor Car Co. 1049 Marshall Street, N.E. MINNEAPOLIS, U. S. A.

Pioneer Motor Truck Builders Established 1906



We Will Help YOU Sell Kelly Trucks

Our sales and advertising department is designed primarily to sell Kelly Trucks for our dealers. We will help you in every possible way.

This means that we will help you by aggressive advertising, intelligent publicity and direct sales co-operation.

A large appropriation will be spent in advertising and sales promotion work this year.

Every member of our sales and advertising department has had long experience in selling. They know how to help you sell trucks —they can sell trucks for you.

This co-operation is *real.*

KELLY TRUCKS

We want you as our agent in your territory. We are willing to meet you more than half way. A word from you will start something NOW.

THE KELLY-SPRINGFIELD MOTOR TRUCK COMPANY
604 **Burt Street, Springfield, Ohio**

Dyneto-Entz

ELECTRIC STARTER

AND LIGHTING SYSTEM FOR COMMERCIAL CARS

SINGLE UNIT SYSTEM

SIMPLE—STURDY—ACCESSIBLE

A starting device is an absolute necessity on a commercial car if a low upkeep is desired. Look on any street and count the number of engines that are left running while the car is standing still, simply because the driver does not want the trouble of cranking-up.

The Entz has no delicate parts to get out of order from jar and shock, it is built just as sturdy as the frame of your truck.

The Entz is the most simplified system for lighting and starting. It consists of a single unit that acts as generator and motor.

The change from generator to motor is done without the aid of automatic devices or any attention on the part of the driver. It is the natural function of the type of mechanism used. The direction of the current is controlled by the speed of the armature through its magnetic fields.

PREVENTS STALLING

When the speed of the engine reduces to a point where it is liable to stall, its revolutions are assisted by the motor and as soon as engine picks up again the assistance from motor ceases, changing the motor to a generator. Battery is so constructed that it cannot be injured by overcharging, doing away with complicated automatic cutouts.

Only one switch—simply throw it on, it is not touched again until you want to stop engine. Adopted by the White Co., and the Franklin Mfg. Co. Illustration on this page shows Dyneto-Entz generator on White Engine.

Write for full particulars

THE DYNETO ELECTRIC COMPANY
SYRACUSE, N. Y.

SALES AGENT—T. J. WETZEL, 42 WEST 42ND STREET, NEW YORK CITY, N. Y.

When Writing, Please Say—"Saw Your Ad. in the C C J"

KEYSTONE GREASE

keeps down the cost of up-keep : : : : :

THE surest way to keep down the cost of motor truck up-keep is to keep up the quality of the lubricant.

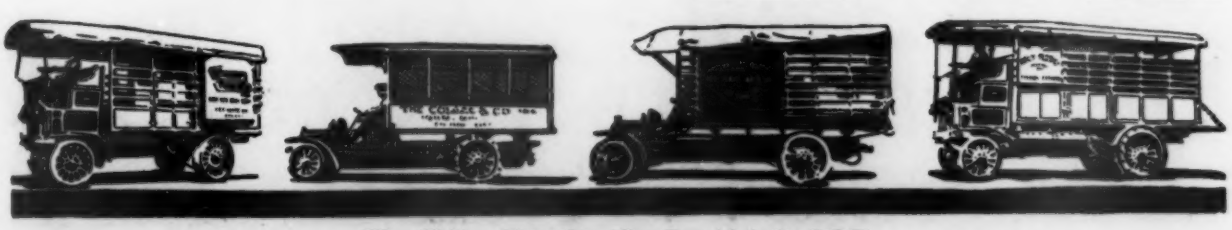
The cost of up-keep is affected to a greater degree by the quality of lubricant used than by any other single factor.

It will pay you to give more consideration to this subject. And the more consideration you give it, the sooner you will see the wisdom of using nothing but a *pure petroleum* product such as Keystone Grease.

A motor car lubricated with Keystone Grease and Keystone Motor Oil runs easier at smaller expense, lasts longer and shows less depreciation than when *any* other lubricant is used.

KEYSTONE LUBRICATING CO.

Executive Offices and Works
TWENTY-FIRST, CLEARFIELD & LIPPINCOTT STREETS
ESTABLISHED 1884 PHILADELPHIA



G. V. Electric Truck Adaptability

Misapplication and not inefficiency, as many are wont to believe, is the direct cause of the numerous instances where motor trucks have failed to live up to the promises made by overenthusiastic power-wagon salesmen. Unless a careful study of operating conditions is made in the first analysis, the idea of motorizing had better wait. "Misfit installations" have done much to injure the industry.

And herein lies our success. To supply a vehicle best suited for the service it is to enter, it is imperative that we have a perfect understanding of the conditions surrounding its proposed use. It takes courage to say, for example: "If you insist on two round trips of 20 miles each *in seven hours* you had better buy a good gasolene truck;" but don't you see where we stand when in a year or two the prospect has satisfied himself that the method of routing we recommended was most economical? If the work is in the field of the Electric, economic law will prove our case and when we do get the order, the right G. V. Truck will be put to work. We have a lot of deferred orders coming to us and we have both the inclination and resources to "sell the right trucks right."

Do you wonder why G. V. Electrics are now serving a class of discriminating purchasers engaged in every line of business worthy of mention? Remember, too, that G. V. Electrics have proved their superiority by years of service and a record for low maintenance costs, unparalleled in the history of motor transportation.

A copy of Catalogue 84, together with some convincing data on horse, gasolene and electric installations will be furnished on request.

General Vehicle Company, Inc.

General Office and Factory, Long Island City, N. Y.

New York *Chicago* *Boston* *Philadelphia*

SHELDON AXLES

Sheldon Equipments Received Perfect Scores

Last month a gruelling 4-day reliability run was conducted by the Washington Post. Not a road or technical penalty was imposed on any of the trucks which were equipped with SHELDON foundations of Springs, Axles, Brakes and Jackshafts for trouble with these parts. At the finish every washer, bolt, nut and cotter was in its original position—exactly as it left the starting line.

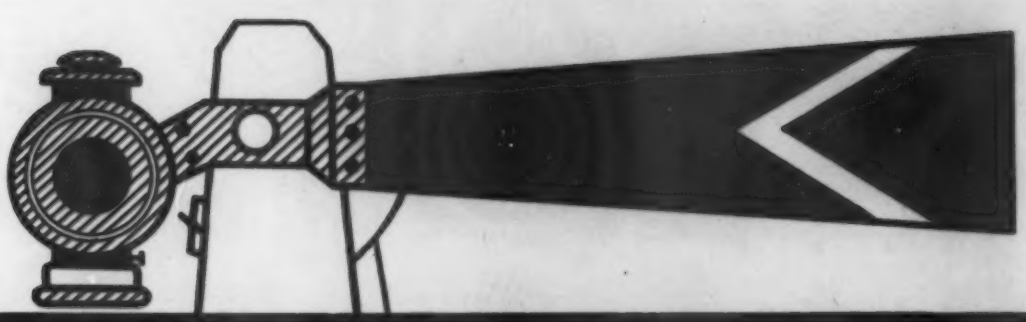
The wisdom of the manufacturers of the above trucks in equipping them with SHELDON foundations of Axles, Brakes, Jackshafts and Springs was proved by this reliability run, which was witnessed by representatives of the government.

SHELDON products are actual sales-helps.

SHELDON AXLE CO. Wilkes-Barre, Pa.

Chicago Office	Detroit Office	San Francisco Office
68 East 12th Street	1215 Woodward Ave.	444 Market Street

SHP



WARNING

This is just what it looks to be—a danger signal. It is the clang of the bell, the toot of the whistle. It's the sign of a hazardous crossing.

Look Out for the Wheels

When you buy a motor vehicle, don't overlook the vast importance of the wheels, the general principles of their construction, the absolute necessity that they should be strong, safe and enduring. The wheels carry the entire weight and load, they bear all the burdens, they are the first to feel every shock and strain. The safety of the occupant, the value of the load, the ultimate efficiency of the vehicle depends upon them.

All wheels look much alike when they are new. Don't be misled. Insist on wheels that are known to be strong, and safe; the kind that will stand up. Avoid wheel dangers by starting right.

SCHWARZ WHEELS are used by all careful manufacturers, irrespective of the selling prices of their cars, because the material is the best, the design and construction are absolutely correct, the interlocking spokes form a positive assemblage which cannot loosen or work out of true, under the most severe strains. In the motor vehicle lexicon, **SCHWARZ** is a synonym for safety.

Strongest, Safest, Most Economical

The universal verdict of all automobile engineers

Write for booklet "Bear the Burden"

The Schwarz Wheel Company

Frankford, Philadelphia, Pennsylvania

ELECTRIC

TEN YEARS CONTINUED SERVICE

has proven the Lansden trucks to be the most reliable and economical means of transportation.

They offer the agent the most attractive outlook.

We have openings for agents in a few good territories.

We invite applications from

DEALERS, Power Stations and Garages

Write for Agency Proposition
Sizes, 750 Lbs. to Ten Tons

THE LANSDEN COMPANY
NEWARK, NEW JERSEY

ELECTRIC

When Writing, Please Say—"Saw Your Ad. in the C C J"

Standard

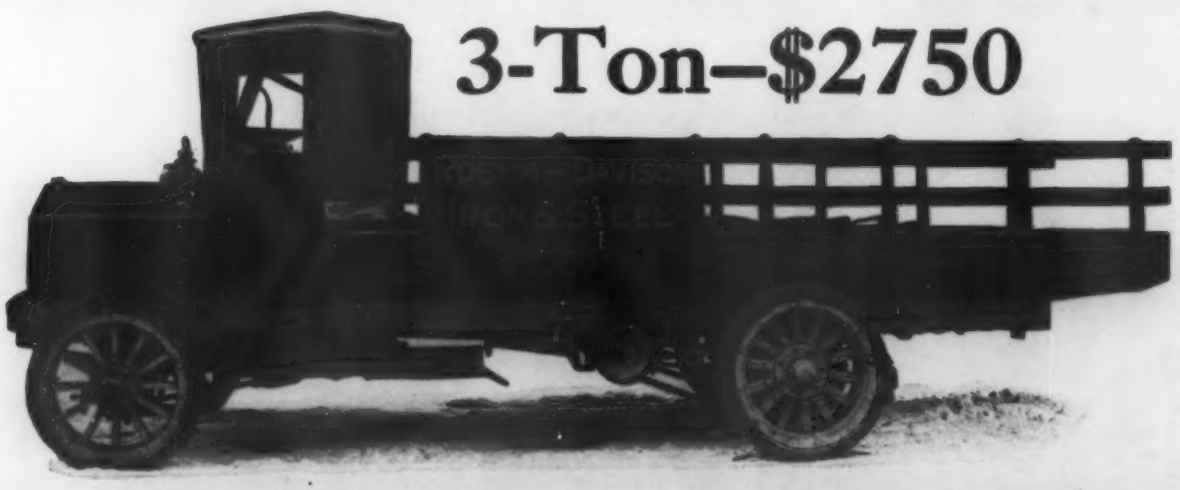
MADE IN DETROIT

THIS is the age of the SPECIALIST. It is a recognized fact that an organization concentrating their entire energies on a SINGLE product, can make a better article at a LOWER PRICE than one that makes a variety of articles.

We are Specialists on 3-Ton Trucks

Likewise the great organizations which produce the component units of the **STANDARD** Truck are specialists in their respective lines. The **STANDARD** is an **ALL-STAR** assembly of the products of the world's most famous specialists. It contains such well-known products as—Continental Motor; Timken-Detroit Axles and Jack Shaft; Brown-Lipe Transmission, Clutch and Control; Gemmer Steering Gear; Perfection Springs, and Spicer Drive Shafts and Universal Joints. It embodies nothing but **STANDARD CONVENTIONAL DESIGN IN ALL PARTS.** No "Features," no new "Ideas," no unproved "Theories"—just **STANDARD** in **EVERY** detail. This policy of Concentration and Specialization, makes it possible for us to produce a Superior 3-ton truck at a very low price.

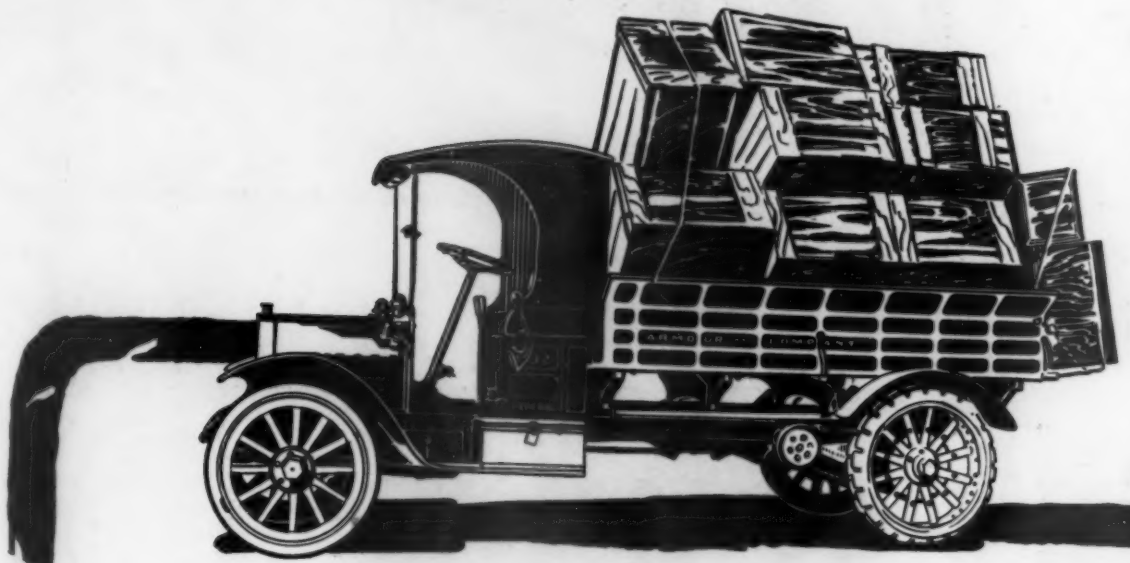
3-Ton—$2750



Standard Motor Truck Company, Detroit, Mich.

FEDERAL

THE TRUCK TRIUMPHANT



The Federal Has Never Been An Experiment

The Federal truck demonstrated the scientific soundness of its design before it was ever offered for sale.

Its power, its strength, its durability and its economy were tried and tested in every conceivable manner.

Today, more than 1000 Federals, of the original Federal design, are in operation, giving such efficient service that the demand for Federals is double that of any two makes of like capacity combined.

Many of America's largest users of motor trucks operate fleets of Federals.

They have purchased their second, their third, and additional Federals on the showing of their first Federal according to the requirements of their businesses.

The Federal has solved their trucking problems for all time to come—let it solve yours.

Write for your copy of "The Blue Book of Traffic."

Federal Motor Truck Co., *Dept. A.*, Detroit, Mich.

RADIATORS

The cooling system on the commercial car is one of, if not the, most important features to be considered. The low gear ratio necessary to negotiate the heavy loads naturally gives the commercial car engine more work than the high-geared pleasure cars.

No matter what the horse power may be, full efficiency cannot be obtained from an overheated engine. An overheated engine not only has to perform its intended natural function of moving the running gear, but is handicapped by impeded moving parts within itself.

Aside from the fact that power is lost, expanded pistons and overheated cylinder walls are about the quickest ways of putting any engine out of commission. Proper radiation for the cooling system is an absolute necessity.

The "LONG" FLAT-TUBE HONEYCOMB RADIATORS solve the problem. The largest radiation surface, with the least weight. The uninterrupted straight tubes eliminate clogging and choking up as in other honeycomb types, and allow a free passage from tank to tank. The corrugated strips between the tubes afford maximum radiation surface and give the strength necessary to withstand the vibration and knocks to which the commercial car is subject.

Write us about it. We have experts who will be glad to give you advice.

LONG MANUFACTURING COMPANY
DETROIT, MICH.

Bearings

This Quantity Is The Result of

HIGH SPEED
NON-GRAN
BEARING BRONZE

Quality

It takes over 600,000 NON-GRAN Bearings a year to supply the demand of the world's best car builders.

The designers and engineers of the World's best cars have tested out every make of bearing bronze and the unanimous opinion has been that NON-GRAN sets the highest mark of quality.

NON-GRAN, on account of its structure, resists the pull of friction. NON-GRAN, as the name implies, is non-granular, it is fibrous. The particles in the construction are all knit together in a solid mass, so that friction on the bearing surface cannot pull these particles from their tightly interlocked positions.

As long as the particles remain in position, the bearing shows no wear. For that is all wear is—the pulling away of the surface particles. As this pulling away of particles goes on, the inside diameter of the bearing keeps getting larger and larger, until it no longer holds the shaft snug.

The interlocked structure of NON-GRAN enables it to withstand the pull of friction for from three to five times longer than any other bronze.

The Choice of the World's Best Car Manufacturers Should Convince You

SIMPLEX STEVENS DURYEA MARMON

Do you often see cars such as these in the repair shop?

GARFORD SAURER MACK

AMERICAN BRONZE COMPANY

1437-1485 CHESTER BLVD., BERWYN, PENNSYLVANIA

Stewart ONE TON MOTOR TRUCK

LIFE is just one big opportunity after another to the man who is wide awake enough to realize it.

You don't have to work overtime knocking your competitors if you are handling the Stewart Trucks

The one big opportunity for you, Mr. Agent, is the Stewart One-Ton Truck.

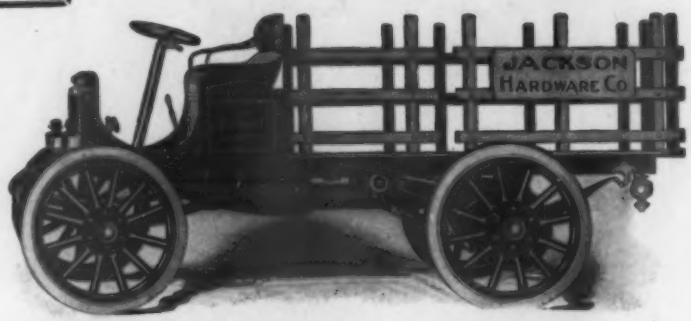
Don't miss it. Write us at once.

$986

Stake or Express Body

F. O. B. Cincinnati
Completely Equipped

Capacity 2000 Pounds
Guaranteed for 50% overload



YOU CAN PAY MORE BUT
YOU CAN'T BUY MORE

"THE TRUCK THAT MAKES HORSES A LUXURY"

THE STEWART IRON WORKS COMPANY ∴ CINCINNATI, OHIO

Truck Economy is Dependent

Upon Knowledge of Truck Mileage

Veeder

Hub Odometer

You, as a commercial car user, must look upon the money paid for trucks as just as much of an investment as money paid out for supplies, additions, stocks, etc., and *you should insist on a proper return from this investment as well as upon the others.*

To make your truck investment pay it is ***absolutely essential*** that accurate records be kept of the distance the truck travels. By such records, and only by these records, can you check your tire guarantee, your drivers' capabilities, gasoline and oil consumption per mile, cost per ton for each mile, etc., etc.

The VEEDER HUB ODOMETER will do this necessary work for you. It registers backwards as well as forward. It is sealed, so cannot be tampered with or altered. It simply takes the place of the regular hub cap and ***can be attached by any mechanic.***

$25

At Your Dealer's or Direct from Factory

No Intricate Wiring, No Cables No Magnets, No Tubes

All we need to know is make, model, size of wheel and year of manufacture of your truck. We ship the HUB ODOMETER to you and you do the rest. Being made by the Veeder Manufacturing Company, whose recording instruments are world-famous in all lines of business, is a sufficient guarantee that the VEEDER HUB ODOMETER is simple, accurate and durable.

Send for Catalogue D, descriptive of HUB ODOMETER.

The Veeder Manufacturing Co., Hartford, Conn.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings.

When Writing, Please Say—"Saw Your Ad. in the C C J"

GOODYEAR
AKRON, OHIO

Individual Block Truck Tire

For those wanting a heavy-service tire, easily applied, non-skid and of exceptional traction.

Suppose you wanted to replace or adjust one or more blocks in a block tire; which would you rather do?

—Have to loosen, take out, put back and handle several ***additional*** blocks that were all right in the first place or make just the one adjustment needed and do it without waste of time or motion?

That is the striking advantage of the Goodyear Individual Block Tire over all others. Each block is held by its ***own fastening.*** To adjust one block you move that block ONLY. You DON'T interfere with any other.

Changing a block is but the work of an instant. Just loosen bolt with common wrench; pry up plate, out drops block; and ***no other block disturbed.***

Saves time, trouble and makes you independent of extra equipment or tire-applying stations.

A long-lasting tire of wonderful strength and ***traction;*** and as easy riding as a tire of continuous tread.

Six Other Labor and Money-Saving Tires for Trucks

Goodyear experts have perfected tires to meet definite needs of all motor trucks, whether heavy, light, speedy or slow. Seven great tires including Individual Block. Each a labor and money saver.

Write for Booklet. Don't think of ***investing*** in tires until you investigate Goodyears. They are giving remarkable service wherever used. And they are used by hundreds who never imagined such tire service possible.

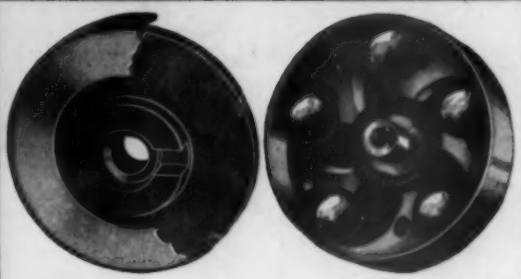
A booklet on Motor Truck Tires tells all. Write for it.

The Goodyear Tire & Rubber Co.
AKRON, OHIO

Branches and Agencies in 103 Principal Cities
We Make All Kinds of Rubber Tires, Tire Accessories and Repair Outfits

Main Canadian Office
Toronto, Ontario

Canadian Factory
Bowmanville, Ontario



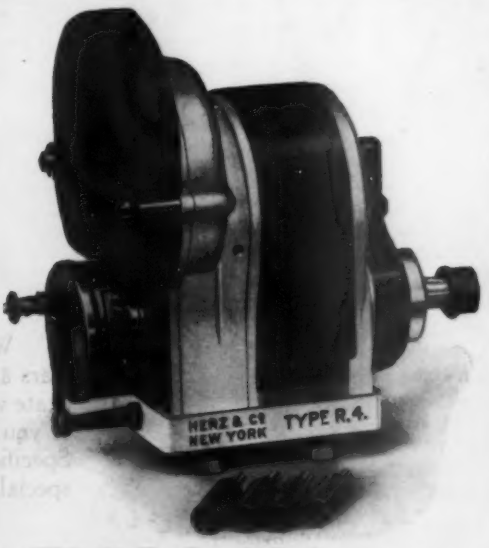
HERZ AUTOMATIC TIME ADJUSTMENT

This simple device marks a tremendous advance in ignition methods from the viewpoint of economy, efficiency and also convenience. In a single step, it has eliminated entirely all pounding and the possibility of back-kicks, reduced gear-changing to the minimum, effected a material saving in gas consumption and insured the maximum efficiency of the motor. It is absolutely noiseless, and can be attached to any Magneto.

The spark is advanced or retarded automatically in proportion to the speed of the motor. This insures the spark of greatest possible efficiency at all speeds.

That the HERZ MAGNETO is far superior to any other make, for use on Commercial Cars especially, is abundantly proved by recent tests which have established to a certainty the fact that this magneto is the strongest of its size and weight in the world. In the official English Test against 15 competitors, HERZ MAGNETO gave a hot, efficient spark at 35 R.P.M. as against 45 R. P. M. for its nearest competitor.

Use the **HERZ MAGNETO** with
HERZ AUTOMATIC TIME ADJUSTMENT

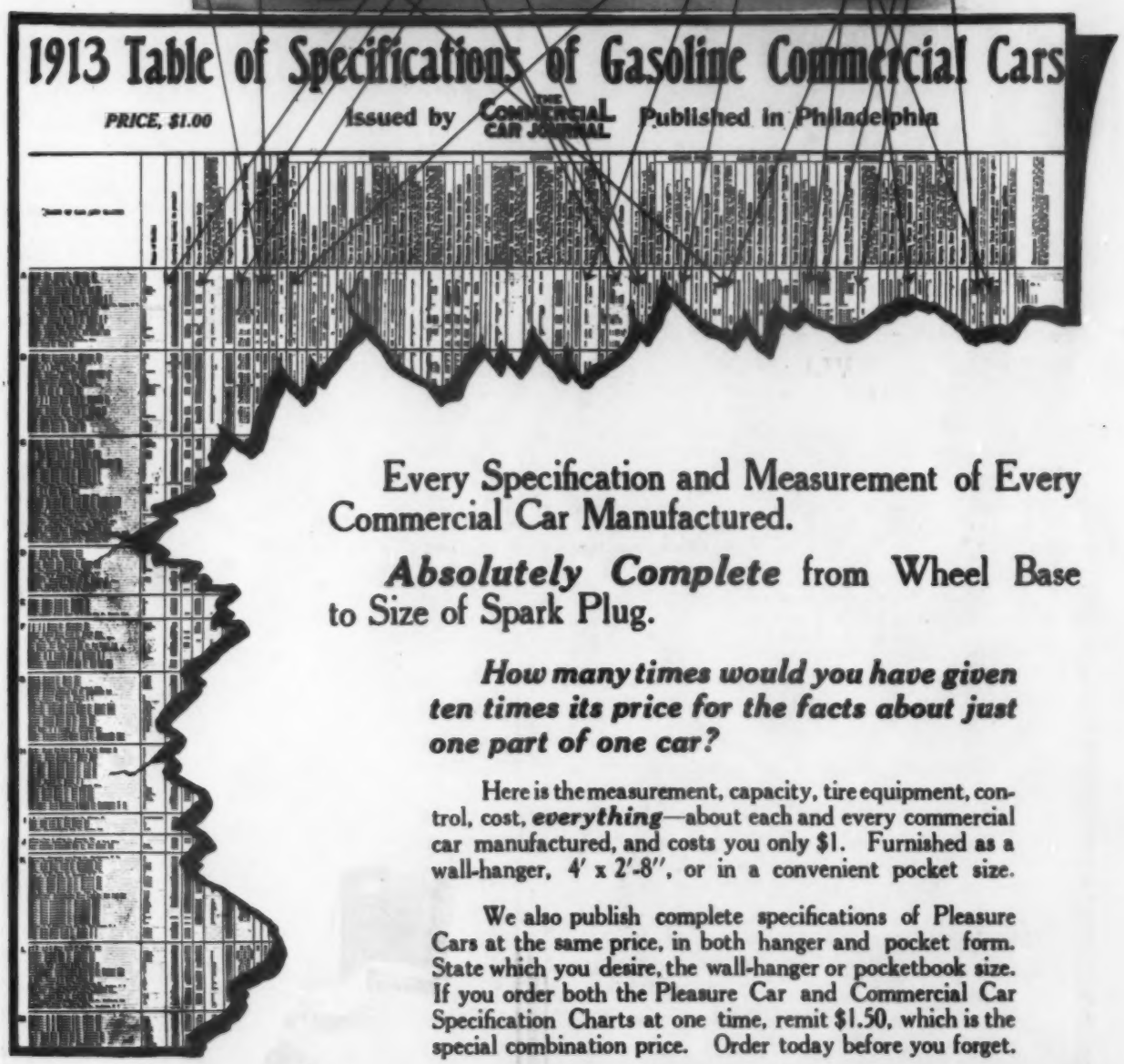


HERZ & CO., 295 Lafayette St., NEW YORK
Manufacturers of the HERZ PLUG ("Bougie Mercedes")

ALL THIS INFORMATION About ALL CARS for ONLY $1

1913 Table of Specifications of Gasoline Commercial Cars

PRICE, $1.00 Issued by THE COMMERCIAL CAR JOURNAL Published in Philadelphia



Every Specification and Measurement of Every Commercial Car Manufactured.

Absolutely Complete from Wheel Base to Size of Spark Plug.

How many times would you have given ten times its price for the facts about just one part of one car?

Here is the measurement, capacity, tire equipment, control, cost, ***everything***—about each and every commercial car manufactured, and costs you only $1. Furnished as a wall-hanger, 4′ x 2′-8″, or in a convenient pocket size.

We also publish complete specifications of Pleasure Cars at the same price, in both hanger and pocket form. State which you desire, the wall-hanger or pocketbook size. If you order both the Pleasure Car and Commercial Car Specification Charts at one time, remit $1.50, which is the special combination price. Order today before you forget.

CHILTON COMPANY, PHILADELPHIA

When Writing, Please Say—"Saw Your Ad. in the C C J"

We Want Agents

to share in the GOOD WILL of a corporation with $11,000,000.00 of capital, with twenty years' experience and with 20,000 customers.

Our SIX factories at Detroit, Cleveland, Erie, Pa., Chicago Heights, Ill., and Franklin, Pa. (2), are turning out high-grade machinery products that are sold and used in every quarter of the globe.

The "Little Giant" Commercial Car is one of these products.

Capacity One Ton

Any Style of Body

Write for Prices and Terms. Address Dept. M.

Chicago Pneumatic Tool Company

1031 FISHER BUILDING CHICAGO

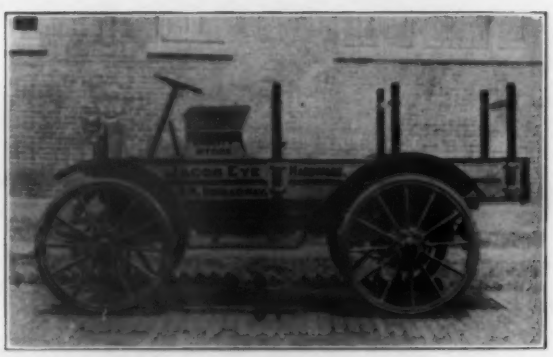
Branches Everywhere

50 CHURCH STREET NEW YORK

$800.00 **MERCURY TRUCKS** $800.00

SPECIAL HARDWARE TRUCK

1000 POUNDS CAPACITY



BUILT SPECIALLY FOR HARDWARE DEALERS

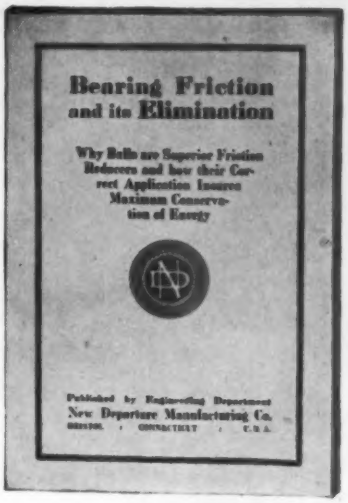
EQUIPPED PER PHOTO: FENDERS, LAMPS, HORN, STAKES, WITH CLEAR 10 FEET INSIDE.

THIS CAR $800.00, OTHER MODELS $750.00 TO $900.00

AGENTS—WE WANT YOU TO GROW UP WITH THE MERCURY

WRITE AND GET OUR PROPOSITION

THE MERCURY MANUFACTURING COMPANY, 4106 S. HALSTED ST., CHICAGO, ILL.


Bearing Friction
and its Elimination
Why Balls are Superior Friction Reducers and how their Correct Application Insures Maximum Conservation of Energy
Published by Engineering Department
New Departure Manufacturing Co.

Can we send you a copy of this Booklet?

Our Engineering Department has published the first of a series of booklets discussing the latest developments in the solving of bearing problems.

This first brochure is entitled "Bearing Friction and Its Elimination," and aims to show why balls are superior friction reducers and how their correct application secures maximum conservation of energy.

The types of bearings particularly discussed and compared in this writing are the ball and roller bearings, as applied to all bearing points in the motor car.

It discusses and explains the growing tendency among engineers and manufacturers to favor the ball type of bearing, as evidenced by the summarization figures published by the "Horseless Age" in a review of 1913 pleasure car models. These figures show that ball bearings are used in the differential of 53% of pleasure cars for 1913, as against 37½% of the 1912 models; in the transmission of 75%, as against 64%; and in the rear wheel of 52%, as against 42%.

This brochure will interest you. Copy will be mailed you promptly on request.

THE NEW DEPARTURE MFG. CO., Bristol, Conn.

Western Branch: 1016-17 Ford Building, Detroit

"ASK THE USER"

There are tens of thousands of them, they will all give you an enthusiastic account of fuel saving, more power and less carbonization since equipping their cars with Leak-Proof Piston Rings.

These owners are getting full compression, every bit of the explosive power of their gasoline is harnessed up so that all the energy is diverted directly to the cylinder heads forcing them down without any leakage between the pistons and the cylinder walls.

There is less carbonization and no black smoke because Leak-Proof Piston Rings keep the lubricating oil from getting into the exploding chamber. **Cut down your up-keep bills.** Get in touch with our nearest branch or write us direct.

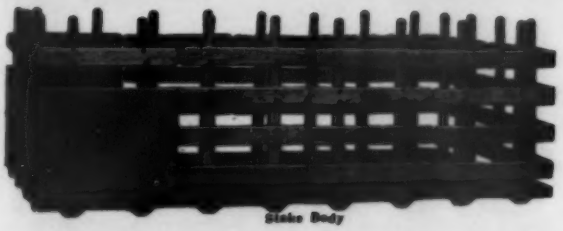
Dealers: Write us for our sales proposition. Orders are coming in from all parts of the country, we want to divert them through you. Better snap this up before someone else in your locality does.

McQUAY-NORRIS MFG. COMPANY

1309 CHESTNUT STREET **BRANCH OFFICES:** **DEPT. "C", ST. LOUIS, MO.**

NEW YORK, N. Y. 33 Lincoln Sq. Court, Broadway at 64th St.
CHICAGO, ILL. Suite 39 Merchants Bldg., 106 N. La Salle
PITTSBURGH, PA. 7620 Tioga Street
KANSAS CITY, MO. 1802 Grand Ave.
LOS ANGELES, CAL. 822 Central Building
FORT WORTH, TEXAS 108 Bryan Avenue
SAN FRANCISCO, CAL., 268 Market Street

HIGHLAND STANDARD BODIES FOR MOTOR TRUCKS



Stake Body

To Standardize is to Economize

The Highland Standard Stake Bodies are manufactured in 27 sizes, and four styles of stake arrangements.

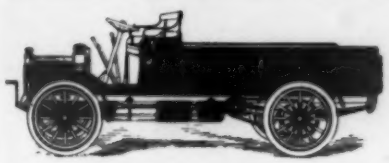
The Highland Standard Flare-Board Bodies are manufactured in 38 sizes, and can be equipped with canopy or screen tops.

The Highland Standard Furniture Bodies are made in 19 sizes, and can be equipped with canopy or screen tops.

From this assortment any Truck Buyer can make a selection best suited to his needs, and is assured of securing a body designed especially for Motor Truck Service. Specify Highland Bodies.

SEND FOR COMPLETE CATALOG

THE HIGHLAND BODY MANUFACTURING CO. - - CINCINNATI, OHIO



BESSEMER owners will tell you it is the best truck for you to buy. Repeat orders prove this.

With 15 years' manufacturing experience why shouldn't we turn out a car mechanically right and with correct design? We believe that there are no trucks on the market offering better values than the BESSEMER line.

1500 lb.	2000 lb.	3000 lb.
$1250.00	$1800.00	$2100.00

BESSEMER MOTOR TRUCK COMPANY, GROVE CITY PA.

ACME
Universal Joints

For Motor Trucks—

Accurate—Durable—Efficient
Absolutely Dust-Proof

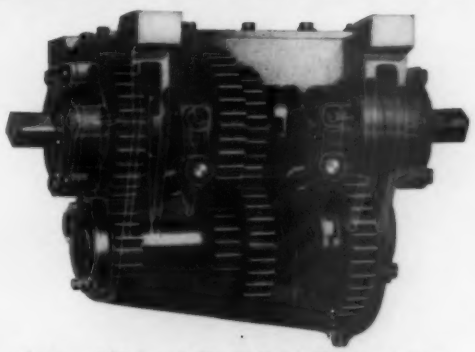
Leading motor truck makers have adopted exclusively the **Acme,** due to improved mechanical features not found on any other universal joint.

We specialize on universals for motor trucks and are in position to meet your every requirement.

Ask for catalog and send your specifications.

ACME UNIVERSAL JOINT CO.
1421 Fulford Street Kalamazoo, Mich.

COTTA TRANSMISSIONS



Internal View of Shaft-Drive Transmission, designed for use in worm-drive trucks

For Heavy Truck and Tractor Service
Eliminate Transmission Trouble

Selective type, individual clutch system. All gears always in mesh. Countershaft and mainshaft gears idle on direct. Improved speed-changing device. No plain bearings —loose gears mounted on roller bearings.

Write for Bulletin

COTTA TRANSMISSION CO.
814 So. Main Street Rockford, Illinois

SPLITDORF

"Always There"

"COMMON SENSE" is, after all, the main feature of SPLITDORF PLUGS, and it is only in the exercise of ordinary intelligence that the merits of SPLITDORF PLUGS are immediately apparent.

Gas-tight, soot-proof and unbreakable, SPLITDORF PLUGS do not short-circuit or carbonize—they were designed and are made to "stand up" under the hardest usage.

For the high-pressure engine and terrific motor speed to a throttled-down and barely revolving motor—SPLITDORF PLUGS are never found wanting.

"New ignition for old" is a SPECIAL EXCHANGE proposition that cannot fail to interest every owner of a gasoline motor that is not equipped with SPLITDORF up-to-the-minute ignition. If you want to save time and money, write TO-DAY for particulars.

SPLITDORF ELECTRICAL CO.
98 Warren Street, Newark, N. J.

BRANCHES:

New York	Chicago	San Francisco
Boston	Detroit	Los Angeles
Philadelphia	Kansas City	Seattle
London	Atlanta	Buenos Aires

Continental Motors

A Mighty Power in the Motor Truck Field

75,000 Continental Motors develop 3,000,000 H. P. daily

This tremendous cataract of Continental power is doing a large share of the world's work. In the market place, over crowded city thoroughfares, upon the highways and byways of the open country, in the freight yards — everywhere — it propels great loads of merchandise with sureness and dispatch.

And more. This famous motor is selling the trucks that bear it, is bringing profit to user, dealer and maker, and is building up many commercial car reputations of merit.

Tap this tremendous force of power for your trucks — use Continental energy.

Continental Motor Mfg. Co., Detroit, Mich.

Factories at Detroit and Muskegon, Michigan

THE RUTENBER MOTOR

Manufactured since 1901 for high-grade

Automobiles and Trucks

3¾ x 5¼ four and six cylinder
4¼ x 5¼ four and six cylinder
Standard or Unit
and
4 x 4, 4½ x 5 and 4¾ x 5 Standard Types
All L-Head, 4-Cycle

Manufacturers are invited to investigate our service and our facilities. Literature on request.

The Rutenber Motor Company
MARION, INDIANA

One Gould Storage Battery Tried Means More, Because Users Want More of the Same Satisfactory Service

Trying out a lot of storage batteries on the "Survival of the fittest" plan is expensive, troublesome, and, if you try Gould Batteries first, will be found unnecessary.

Tests thoroughly prove that Gould Storage Batteries combine high capacity and long life to an extent not found elsewhere, and as we base the selection of a battery in each instance upon the purchaser's service conditions, the customer takes no risk.

If your storage battery problems are special, our engineers will gladly advise to your best interests as to the best course to follow.

WRITE FOR LITERATURE TODAY

Gould Storage Battery Co.

General Offices: 30 E. 42nd St., New York
WORKS: Depew, N. Y.
Agents in all large cities
Full stock carried in all cities where we have offices or agents.
(68)

MAIS

1½—2—2½—3 Tons

Internal Gear Driven (no chains)

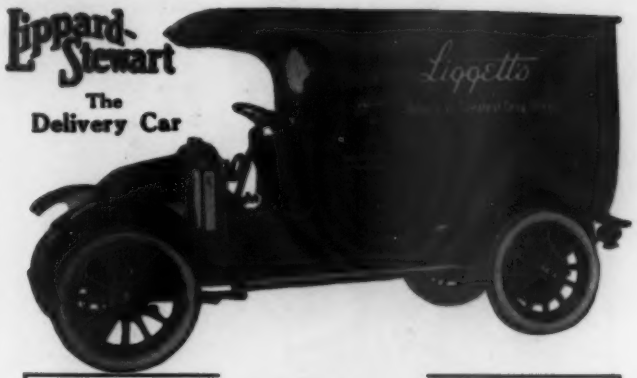
Nickel steel—or better—from bumper to tail gate. The fact that 66% of our factory output is made up of re-orders is proof that the MAIS is the best proposition for User and Dealer.

MAIS

MOTOR TRUCK COMPANY

INDIANAPOLIS · · · INDIANA

"The Truck Which Popularized The Internal Gear Rear Axle Drive"



Lippard-Stewart Cars
Guarantee Efficient Delivery

Lippard-Stewart Delivery Cars give service because they are built to give it. They assure quick and dependable delivery over a wide territory at the minimum cost per package, because they are constructed by engineers who know and have fulfilled every requirement demanded of a thoroughly efficient delivery vehicle.

Read These Special Features of Lippard-Stewart Construction

Continental 30 H. P. Motor — Timken Roller Bearings Throughout
Eisemann Magneto — Special Spring Suspension
Brown-Lipe Selective Transmission — Left-Hand Drive
Cone-Clutch — Every Part Easy of Access
Full-Floating Timken Rear Axle — Tires—36 x 4½ Front and Rear

Lippard-Stewart Motor Car Co., Buffalo, N. Y.

AUGUST BECKER .....Pres. & Treas. | J. C. MILLAR .....Secretary.
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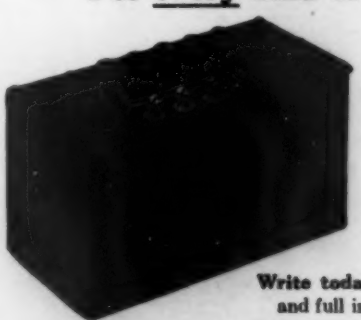
Force-Feed Oilers with two compartments

Detroit Force-Feed Oilers are made with **two** compartments (as well as one) for feeding two different kinds of oil. One compartment feeds gas-engine oil to the cylinders—the other feeds a cheaper, heavier oil to the bearings, etc.

The use of the second compartment gives an accurately measured feed to each part, a completely centralised system and freedom from all annoyance, wasted oil and damage to the engine.

For every kind of truck



Detroit Oilers are made in styles and sizes for every type of gas engine—commercial truck, automobile, marine, stationary, gas tractor—with any kind of drive and every provision for easy installation.

Once adjusted, it never has to be regulated. The quantity of oil fed is automatically regulated by the engine speed.

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HERBERT N. CASSON, L. W. ELLIS and ROLLIN W. HUTCHINSON, JR.

Many of the facts are startling in their magnitude. As these writers claim that the total horse-cost is now $2,000,000,000 a year for maintenance alone, the problem of displacing horse-power by trucks and tractors is one of great interest to all concerned.

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COMMERCIAL CAR JOURNAL

Market and 49th Sts. PHILADELPHIA, PA.

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"Deliver the Goods"

A Service of Strength With Simplicity

TO THE SAVING of time and increased service made possible by motor trucks, the Adams adds the security furnished by a carefully manufactured product built in its entirety by a single factory.

With straight line connections from its instantly accessible motor, the Adams is the simplest car to handle, while the strength of its parts insures minimum repair bills.

Built in 1 ton, 1½ and 2 ton models, with bodies to suit the service required.

WRITE US TODAY ABOUT OPEN TERRITORY

THE ADAMS BROTHERS COMPANY

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First American Truck Manufacturers to use the French Type Hood (Radiator rear of the motor.)

KOEHLER COMMERCIAL CAR

CARRYING CAPACITY 1600 LBS. $ PRICE 750.

The Maximum Car at Minimum Price

Open Flare-Board Type

Large and roomy. Inside measurements, 44 inches wide, 84 inches back of driver's seat to rear. Flare-boards, 17 inches above floor. Strongly ironed throughout, also ironed to receive four-post canvas top, which can be had from stock at $40 additional. **Capacity, 1600 lbs. Price, $750.** Prices of various types of bodies range from $40 to $150 extra.

All styles of bodies are obtainable. **KOEHLER** is built in Newark, N. J. and is backed by an organization of integrity and capital.

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To insure control under all conditions, THE BEST OF BRAKE LININGS must be used. Demand it by name.

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Used and recommended by all motorists, dealers and manufacturers who are not swayed by "price." We stamp the name in every foot of the lining to protect you from inferior substitutes.

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represent the last word in the art of truck body building. They stand for strength, stability, sturdiness and efficiency. Made entirely of steel, they will not rot or crack. They cannot warp or split. They will stand the maximum use or abuse and are practically indestructible. They eliminate fire risk. They are light in weight and easy on tires—pleasing in design and attractive. Summed up in a word, they give the highest degree of Service.

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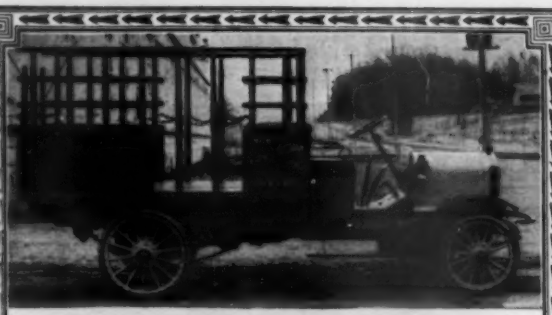

Delivery Dollars Saved!

The economy of motor trucks for delivery work is conceded by big business men everywhere. Experience has told that motor trucks are quicker, surer and cheaper. The point to consider, is: "Which truck will save the *most* money—which is the *most* economical—which costs less in upkeep?"

Dart

Motor Trucks

Model E D--2 cyl. $750 Model B--4 cyl. $1200 Model C--$1775

The maintenance cost of Dart Trucks is exceptionally low because of their sturdy construction. By direct comparison you will find that Dart Trucks offer more value than any other trucks on the market—more quality—more substantial construction. Let us tell you about the low upkeep cost of Dart Trucks.

The illustration shows a Model C Dart Truck with special body. 3000 lbs. capacity. 40-h. p. cylinders, 4 1-16 in. x 5 1-2 in. Complete with body and all equipment, $1950.

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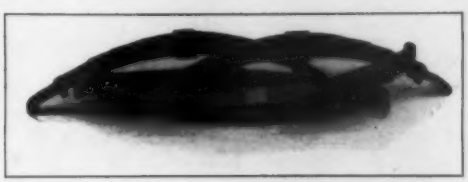
"Honestly Made—High Grade"

Banded Motor Truck Springs

FOR THE MOST SEVERE SERVICE



¶ We are furnishing Springs for the best Motor Trucks and desire an opportunity to figure with you.

42 Years Experience
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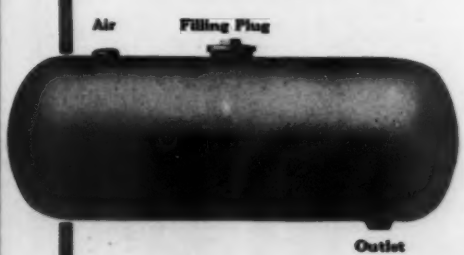

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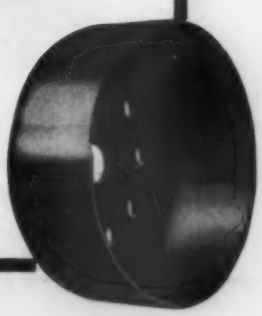
Any Diameter, Gauge or Height



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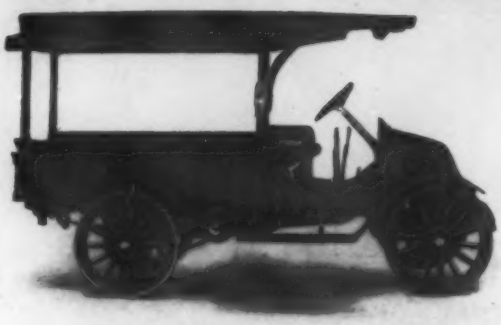

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Capacity 1600 Pounds

The Palmer-Moore Truck is designed to furnish reliable service at low upkeep expense. It is so simple that no high-priced man is required either to operate it or to keep it in condition. All its work is done quietly at a low motor speed which reduces noise, vibration and wear to a minimum. Write for descriptive circular.

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World's largest Manufacturers of Ignition

YOU do not want flimsy and frail ignition on your truck; you do not want ignition that will fail during the busy season.

What you do want is a sturdy, staunch, reliable magneto built for rough work under all traffic conditions.

The Remy truck magneto is designed by Remy engineers after actual experience in gasoline truck transportation. Specify "Remy Magneto."

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How Much Money Do Your Motor Trucks Waste?

If you could be with each vehicle for one day, you would be amazed at the time that is lost at loading stations and on the road—Time that you could save if you knew about it. This waste of overhead charges and investment costs you more than the *waste* of fuel, oil and repairs combined.

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Make a big cut in truck operating expenses. Each block being individual, there is no possibility for heat generation, and the full wear of the rubber is assured. Victor Blocks have perfect traction all the year round—no necessity for chains.

A block may be removed in a few minutes by simply taking out one bolt. This means an end to long road delays and keeps deliveries going on schedule time.

We also manufacture the

VICTOR ENDLESS TIRE

Especially adapted for light delivery trucks and for front wheels of heavy duty trucks. It has a base composed of several layers of heavy duck impregnated with a hard rubber compound. Adheres perfectly to its base, does not creep upon the wheel and gives the full wear of the rubber down to the flanges.

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THE PERFECTION SPRING CO.
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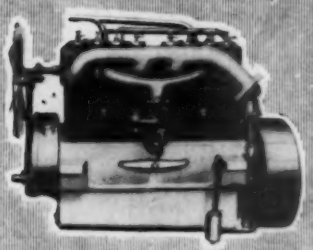
MAKE your guarantee of truck efficiency mean what it says. The truck equipped with the Waukesha Long-Stroke Truck Motor fulfills every promise your guarantee makes—because it's a motor with unlimited capacity for hard work—because its strength combats abuse and carelessness and keeps down the upkeep expense to the minimum—because it consumes less fuel than any other motor, and because it's strictly a truck motor.

The Waukesha possesses strength to a most unusual degree. The crankshaft is of double-heat treated nickel-chrome steel, with tensile strength of 70 tons. That metal is exclusively our own process. So, too, is the metal from which the Waukesha

WAUKESHA
4¼×6¾" LONG STROKE TRUCK MOTOR



bearings are made—they have greater resistance than Parsons' White Brass. The construction of the motor as a whole has the comparative strength of these two parts.

The truth regarding the Waukesha Motor makes fascinating reading for the truck manufacturer. Ask us!

WAUKESHA MOTOR CO., Dept. A, Waukesha, Wisconsin

ROSS
STEERING and
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GEARS
are standard on good motor truck construction

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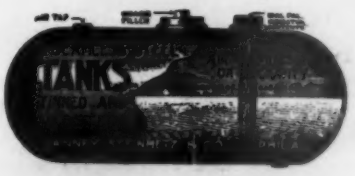

This is the
"Jasco Tank"

¶ It is made absolutely seamless and leakless, of drawn steel, thoroughly tinned and tested. It is

THE SAFETY GASOLENE RECEPTACLE FOR THE AUTO

¶ It not only insures the safety of the car and its occupants, but stops the constant drain on pocketbooks caused by waste of gasolene. Made in all standard styles and sizes.

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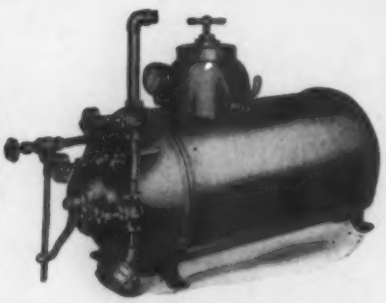
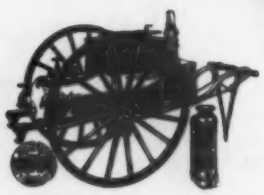
HAND EXTINGUISHERS and TANKS

of every description for department apparatus. We are equipped to make tanks of any size or type.

We also provide a complete line of Chemical Engines, mounted on wheels for service in factories, towns, villages, etc. Hose Reels, Hose Axles, Ladders, Hooks, etc.



35-Gallon Copper Tank



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"Vanity on the highway" still pays a ridiculous toll for automobile travel. But two hundred thousand new Fords will this season go to buyers who prefer real service at reasonable cost rather than ostentatious display at unreasonable cost.

More than a quarter of million Fords now in service—convincing evidence of their wonderful merit. Runabout, $525; Touring Car, $600; Town Car, $800—f. o. b. Detroit, with all equipment. Get interesting "Ford Times" from Dept. F, Detroit; Ford Motor Company, Detroit, Michigan.

Hyatt Quiet Bearings

Line Contact is the basic principle of the Roller Bearing as against Point Contact of the Ball. There results a vastly increased surface to support the load, reducing the duty per unit section of the operating parts and increasing their life in a like proportion.

The flexibility of the Hyatt Roller absolutely insures full line contact, hence guarantees uniform distribution of the load.

Flexibility is an exclusive feature of the Hyatt Roller.

Hyatt Roller Bearing Company
DETROIT, MICHIGAN
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We Ship on Approval

prepay freight and allow

30 DAYS FREE TRIAL

The best "Nonskid" puncture-proof device on earth for Commercial Cars.

Try them at our expense. Be your own judge—don't take anyone's word for it. *"The proof of the pudding is in the eating."*

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"Famous for their Durability"

Employ the largest number of balls of the greatest diameter —thereby— increasing the load-carrying capacity.

Have been adopted by prominent builders of commercial cars because of their superior quality.

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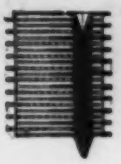
USED ON OVER 100,000 PLEASURE AND COMMERCIAL CARS OF OVER 250 MAKES



The EVANS Model "HELE-SHAW" CLUTCH

Multiple disc running in oil. Illustration shows its exclusive design—discs having wedge-shaped annular grooves which have a grip like a vise, yet are slippable indefinitely. The most perfect clutch made—most durable, gives absolute control, perfect safety and eliminates the jerk.

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Noiseless—Unloseable

M & E Grease Cups

Are constructed so that the cap can neither rattle nor be lost. The end (B) of spiral spring acts as a pawl catching in corrugations (A) in the cap. When cap is turned the pawl slips from notch to notch and prevents vibrating loose. They lubricate perfectly. Made in brass or steel as short or long as desired. Are standard of the world and used exclusively by the best car manufacturers.

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3 BIG FACTS YOU SHOULD KNOW

about the Republic Steel Base Motor Truck Tire: 1, that this tire holds securely to the rim and cannot creep, because it is keyed on under high pressure; 2, that you can run it clear down to the hard rubber counterbase without causing chunks of the rubber tread to tear out; 3, that only external road-wear can affect it.

These three features make this motor truck tire more economical and efficient than any other style of tire. Let us give you the full facts and figure on your requirements.

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Our extensive manufacturing facilities enable us to meet your every requirement.

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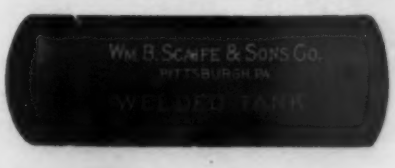

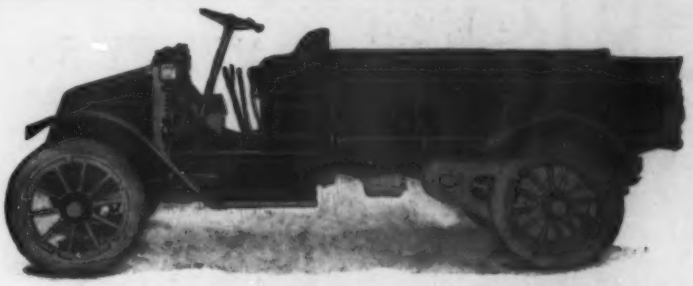

Sandusky Model "B" 1500 lb. Delivery Truck
Price complete, as shown, $1500.00

Constructed for hard business service—not of pleasure-car type.
Designed for economical operation.
Long stroke, 30 H. P., 4 cylinder, 4 cycle **motor**, equipped **with governor** to control speed.
Selective sliding gear **transmission.**
Double chain drive with chains enclosed.
Center control with left-hand drive.
QUIET and absolutely RELIABLE.
Not an assembly proposition, but manufactured by us in our factory, as is also our 1½ ton truck.
Write us. Do it today.

Sandusky Auto Parts & Motor Truck Co.
Sandusky, Ohio, U. S. A.

CROCE 1500 lb. Delivery Wagon

(Closed Body)

Price, Chassis, $1,750. **Complete, $1,850**

Croce Delivery Cars are worth looking into whether you are agent or purchaser. Our cars are not built for the man that is looking for cheap material. This car is built to last and is built for the man that knows a good car. THE TIME IS PAST WHEN COMMERCIAL CARS SELL BY THEIR LOOKS.

Remember, Mr. Agent, you cannot build up a business of any standing with a fake-it-up proposition and stand good to build up trade. Get that idea out of your head;—this has been done long on pleasure goods and is done every day.

But Commercial cars are different, it must be the best to stand the test and this is none too good. Where are you standing, on cars not making good?

Investigate Croce Trucks. You will thank yourself if you do. This is the time to do it. Send for Catalogue (A)—that will tell you what the Croce Cars are made from.

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AUTOMOBILE PARTS

TRANSMISSIONS **GEAR SHIFT LEVERS**
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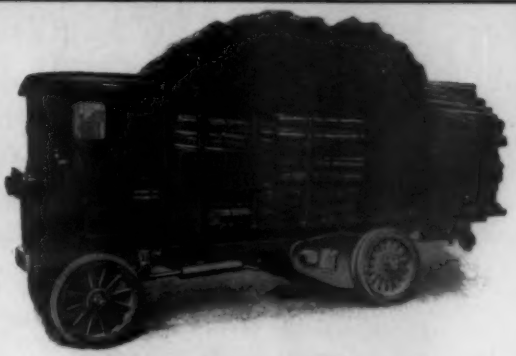
KING 3½ Ton Truck

There is no question as to the quality and efficiency of the King. This means low cost of maintenance. If you want a truck that will do real work and stay on the road, it will pay to investigate.

We can give you the service
Territory for reliable agents

A. R. KING MANUFACTURING CO., Kingston, N. Y.



In an Avery Truck Dependability and Service are Assured

When you buy an Avery Truck you are assured of two very important things, which mean either success or failure to you in motor truck transportation.

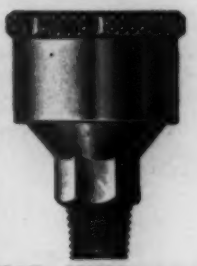
They are the **Dependability** of the truck, and **Service** from the company after buying.

That Avery Trucks are dependable is easily proven by the fact that some of them have been out in active service for six or seven years and are still making good. One Avery truck has been run nearly 70,000 miles and has never received any attention outside of that given it by its owner.

That you will get prompt and efficient **Service** from the Avery Company after buying is also proven by the fact that we have and maintain branch houses and service stations in many of the leading cities throughout the United States.

Our new catalog is just off the press. Ask for a copy. Address

THE AVERY COMPANY, 950 Iowa St., Peoria, Ill.



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Empress

BRASS AND STEEL

GREASE AND OIL CUPS

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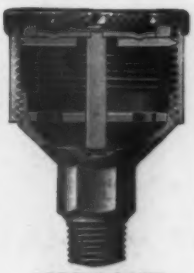
Our line of Oil Cups is equally satisfactory and complete.



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Catalogue on Application

Bowen Manufacturing Co.
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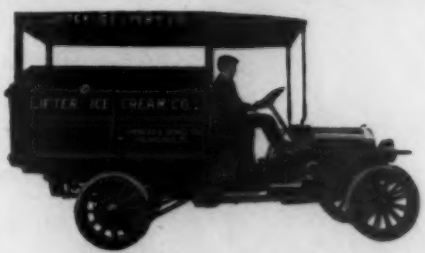

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ROWE TRUCK

In the Service of the Lifter Ice Cream Co.

The Lifter Ice Cream Company operates two Rowe Trucks in its regular service in West Philadelphia and Manayunk. The delivery is made in one-half the time made by wagons, and, in addition, each truck is enabled to take two wagon routes. No severer test can be given any truck than hauling ice cream, the packing of which is more or less destructive to trucks. The Rowe Truck has solved the difficult problem of ice cream delivery.

Rowe Motor Manufacturing Co.
COATESVILLE, PENNSYLVANIA

B. A. Gramm's Motor Trucks

Newest Designs, Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

The Gramm-Bernstein Co.
Exclusive Motor Truck Builders
Lima, Ohio, U. S. A.

When Writing, Please Say—"Saw Your Ad. in the C C J"

BUCKEYE Motor Truck Jacks

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity		List Price
7	11⅛"	6⅛"	18"	16 lbs.	2½ tons	with formed handle	$10.00
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Spicer

Universal Joints

***For* Commercial and Pleasure Motor Cars**

Consult our representatives:

K. Franklin Peterson, 122 S. Michigan Blvd., Chicago
Thomas J. Wetzel . 17 West 42nd Street, New York
L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit

Foreign Representative: BENJAMIN WHITTAKER, 21 State St., New York

SPICER MFG. CO. - - PLAINFIELD, N. J.

BOLLEE LAUTH-JUERGENS RANDOLPH SEAGRAVE KISSEL GRAND RAPIDS SCHNEIDER KINNEAR PEERLESS RENAULT

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"INSURANCE FOR BUILDER AND USER"

RHINELAND MACHINE WORKS CO

140 WEST 42nd ST NEW YORK

GEBRUDER STOEWER ARIES KELLY NAGANT PANHARD PEUGEOT DELAHAYE MACK DE DIETRICH AUTO-METALLURGIQUE

FEDDERS

Real Square Tube Radiators

¶ Commercial cars require radiators that will stand many shocks and much hard usage. This was one of the weak parts of the commercial car but the test of time has proved that FEDDERS radiators render efficient service.

¶ We want to figure with you your requirements for the coming season. If you haven't used Fedders radiators you probably have had a great deal of radiator trouble and you may think that there isn't a radiator built that will give you satisfaction. If this is the case we would like to have an opportunity of demonstrating that the Fedders radiator will stand the wear and tear and shocks of the commercial car and that manufacturers who equip their commercial cars with the Fedders have practically no radiator trouble. We can convince you. Will you give us the opportunity?

FEDDERS MFG. WORKS
BUFFALO :: NEW YORK

When Writing, Please Say—"Saw Your Ad. in the C C J"

Tire economy and the PIERCE-ARROW 5-TON MOTOR TRUCKS

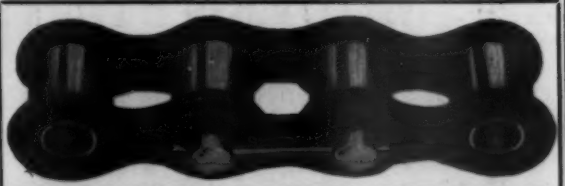
IT is not usual for motor truck tires to last much beyond the tiremaker's guarantee of 8,000 miles.

But records kept on a vast number of Pierce-Arrow Trucks show that the average mileage, given by the several makes of tires used, is considerably larger than this—that in many cases the original tires have given *double* the guaranteed mileage, and are still running.

This is largely because the worm-gear drive and the distribution of 85% of weight on the rear wheels keep these wheels from jerking and grinding the road—and because of the Pierce-Arrow's flexible frame.

Tire cost is the largest single item in motor-truck operation. Be sure to consider tire economy when making your selection. It is only one of the economies obtained in the Pierce-Arrow Motor Truck.

THE PIERCE-ARROW MOTOR CAR COMPANY, BUFFALO, N. Y.



"The Coventry" Detachable Roller Chain

Note the large heavy-duty cotter-pin connecting the two rivets. The mechanical superiority of this method of coupling can easily be appreciated. Vibrations and jars cannot weaken the double-size coupling as is the case where two smaller cotter-pins, one for each rivet are employed.

Combine the established reputation of "The Coventry" Chains for precision, perfect retention of pitch and unparalleled durability with this final touch of perfection and you will understand why "The Coventry" Chains are consistently specified by those desiring the maximum of transmission efficiency.

Our catalog comprehensively covers "The Coventry" line, and will be sent immediately upon request.

Sarco Engineering Co.
Dept. V 116 Broad Street New York

Swinehart Cellular Truck Tires

Most resilient solid tire made. Absolutely non-skid. Increases traction and eliminates undesirable slipping and friction. Does away with the use of chains. The holes in the tire act as a radiator, preventing excessive heating and internal friction. The extra large surface of the Swinehart tread reduces the pressure per square inch to a point well within the safe and economical limit.

The wonderful elasticity, due to the combined use of our cellular design and the highest grade of rubber, allowing the tire to "give and take," to stand the road shocks without damage, is the true secret of Swinehart longevity. Demountable Quick Attachable.

We also make a full line of smooth tread and block tires, single and dual.

THE SWINEHART TIRE & RUBBER CO.
AKRON, OHIO
Boston Branch, 727 Boylston Street

SAGER Shock Absorbers

Absolute Necessity for Commercial Cars

SUCCEED WHERE OTHERS FAIL

Endorsed by:

SAURER
FRANKLIN
ATTERBURY
KISSEL KAR
STEWART
OLDSMOBILE
ELMORE
CRAWFORD
LOGAN
DORRIS
RAMBLER
MAXWELL
STODDARD-DAYTON
POPE-HARTFORD
AUTOCAR
COLUMBIA

Try a set at our expense

We also make bumpers to protect radiator and other vital parts at front of truck.

J. H. SAGER COMPANY
293 South Ave. - - Rochester, N. Y.

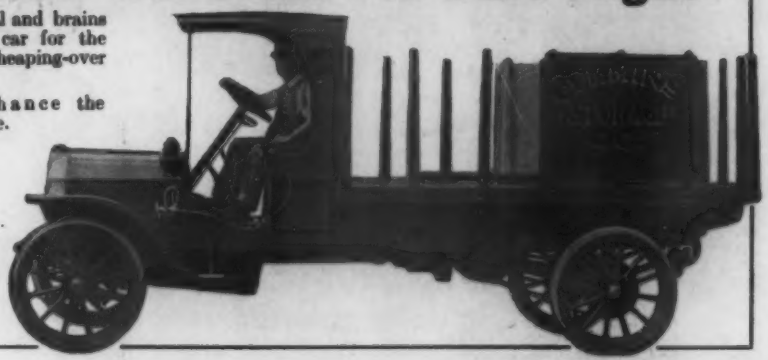
The "MODERN" Truck Will Strike You Just Right!

It's built right. The stuff is in it—both material and brains—minus all fuss and jim-cracks. A practical car for the practical buyer—the man who likes to get heaping-over measure for his money.

The closer you investigate it the better chance the "MODERN" has of landing in your delivery garage.

MR. DEALER: An agency for the "MODERN" not only makes selling easy, but it brings you prestige. The "MODERN" is a live proposition for a live agent. Write today for some interesting facts we have to present to men who are in a position to sell trucks. And you men who are not selling trucks, we've got something to say to you. We say it in a way that gripe and the illustrations that go with the talk will make you sit up. Write today.

The Bowling Green Motor Car Company
Dept. A **Bowling Green, Ohio**



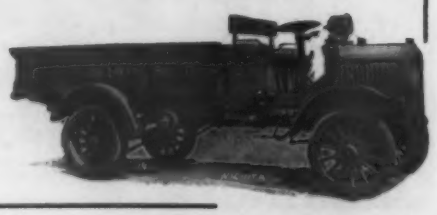
Model "B" 2-Ton
Chassis $2100

WICHITA TRUCKS
1 and 2 Ton Capacities

Dealers: Write or wire us for sales proposition, territory is being snapped up rapidly.

Wichita Falls Motor Company
WICHITA FALLS, TEXAS

Model "A" 1-Ton
Chassis $1650



LANGE TRUCKS
PREDOMINATE IN PITTSBURGH

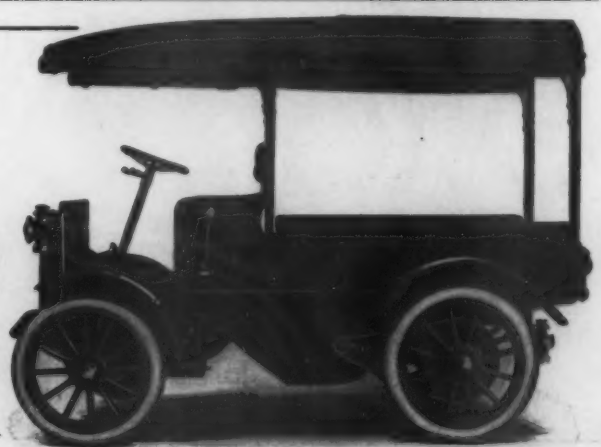
WRITE FOR LIST OF USERS AND LEARN HOW CAPABLY THEY MEET EVERY EMERGENCY UNDER THE MOST TRYING CONDITIONS. CATALOGUE ON REQUEST.

LANGE MOTOR TRUCK CO., PITTSBURGH, PA.

"BEST"
1000 to 1250 lbs. Capacity
42" x 72" Loading Space

Price, with Top, Pneumatic Tires } $890.00

FLINT MOTOR WAGON DEPT.
DURANT-DORT CARRIAGE CO.
FLINT, MICH.



When Writing, Please Say—"Saw Your Ad. in the C C J"

1909 1913

Pioneer
Truck Steering Gear Mfrs.

We make more steering gears for commercial vehicles than any other manufacturer.

WHY?

Because the truck manufacturers recognize that the Lavigne all-steel gear is of superior design and the ultimate user **knows** it.

Standard For:—Commercial Cars, Trucks, Tractors, and High-Grade Pleasure Cars.

Write for Blue Prints

THE LAVIGNE GEAR CO.
STATION A RACINE, WIS.

COVERT

TRANSMISSIONS

Made by Specialists

COVERT TRANSMISSIONS GIVE perfect service, because they are designed and built by men thoroughly acquainted with every requirement that is made by a motor car transmission.

For Commercial Vehicles of from 500 to 10,000 lbs. capacity.

For Pleasure Cars of from 20 to 60 H. P.

Covert Motor Vehicle Co.

Sales Office—
Detroit, Mich.

Factory—
Lockport, N. Y.

Motor Truck Bands

MADE WITHIN THE FOLLOWING

Dimensional Tolerances

(ADOPTED BY THE SOCIETY OF AUTOMOBILE ENG.)

1.—Tolerance in circumference of felloe band:

	Plus	Minus
Before application to wheel - -	1-32"	1-32"
After " " " - -	1-16"	1-32"

Variation from precise measurement shall be uniform over entire width of band.

2.—Tolerance in width of felloe band:

	Plus	Minus
Up to and including 4" - - -	1-32"	1-32"
4—1-16" to 6" - - - - -	3-64"	3-64"
6—1-16" to 12" - - - - -	1-16"	1-16"

3.—Variation in trueness of band when placed on surface plate: Band shall touch at all points within 1-32" up to and including 6" width. Over 6" width within 1-16".

4.—Variation in thickness of band: .006" plus or minus.

5.—Trueness to round. The radial tolerance on the wheel when felloe band is applied shall be 1-16" plus or minus. This plus or minus tolerance must not occur at diametrically opposite points. There shall be no flat spots or kinks in felloe band on the finished wheel.

The Standard Welding Company
CLEVELAND
NEW YORK CHICAGO DETROIT

Chrome VANADIUM Steel

As year after year passes by, you undoubtedly have noticed a wonderful improvement in the quality of your products and you realize that invariably high quality is synonymous with long experience.

And so it has been with **OUR CHROME VANADIUM STEEL.** We were pioneers in this industry and have been second to none in progressiveness, hence it may readily be believed that our long experience is evidenced in the excellence of our product.

OUR CHROME VANADIUM STEEL is made under our own secret process, patents for which are now pending.

Write for our booklet on Chrome Vanadium Steel.

The United Steel Co.
Canton, Ohio
New York Chicago Detroit Cincinnati

Reduces Gasoline Bills 25 to 40%!

The Mondex-Helix Mixer

The New Carburetion Method

MONDEX-HELIX

in Combination with any Carburetor

Saves one-fourth to about one-half gasoline and doubles the power of poor gasoline.

Gives 100% increased flexibility. Increases power on hills and all grades—at minimum and maximum speeds—from 10% at high speed, to 50% at low speed—*particularly heavily loaded vehicles.*

Makes a noisy motor silent and smooth. Prevents back-firing and carbonization. It minimizes wear and tear.

PRICES

Sizes for any carburetor sent, with full instructions, C.O.D. or by mail on receipt of price.

Sizes 1 inch to 1½ inch . . $3

Sizes 1½ to 2 inches . $4

On and after June 15th the price of Mondex-Helix for all sizes will be $5.00.

Used by the Consolidated Gas Co., I-T-O-A Cab Co., Knox Automobile Co., Selden Motor Vehicle Co., Western Electric Co., Long Island R. R. Co., Mason-Seamon Transportation Co., U. S. Motor Cab Co., N. Y. Telephone Co., John Wanamaker, Stern Bros., Brooklyn Eagle, Burns Bros. and hundreds of other large concerns.

AGENTS WANTED

THE ARISTOS COMPANY
254 W. 54th St., N. Y.

The Krebs Governor Doubles Its Efficiency and Cuts Down Its Maintenance Charges

THE ONLY SAFE car is a governed car. The only variable governor is the Krebs. Its perfect control of the motor through the fuel supply makes the Krebs "The Car That Thinks."

With the governor set for the maximum speed desired, the Krebs will make precisely that speed, hour after hour, on good roads or bad, and without regard to grades.

This relieves the driver from all care of the motor when his car is going along. He has nothing to do but steer.

The Krebs Governor acts more promptly than human will. You cannot race the motor at starting, and when stopped the governor leaves the motor with charged cylinders—ready for instant action.

Every prospective owner owes it to himself to learn what the Krebs Governor will mean to him in added efficiency and reduced cost of maintenance of motor truck service. Write today for full information.

Still some good open territory for live Agents.

MODEL DD, 1½ TON KREBS
with Cincinnati Type Stake Body, as illustrated, including dual rear wheels, $2,000

144 in. Wheelbase. 3⅛ x 5½ in., four-cylinder, four-cycle motor.

Price of chassis only, with 36 x 3½ in. front and 36 x 4 in. rear wheels, $1775 f. o. b. Clyde, Ohio. With dual rear wheels $75 extra.

Electric Lights and Starter, if desired, at nominal additional cost.

THE KREBS COMMERCIAL CAR CO., Clyde, Ohio

When Writing, Please Say—"Saw Your Ad. in the C C J"

STANDARD
Adjustable Taper Roller Bearings

After exhaustive tests, S.R.B. Taper Roller Bearings have been selected by the following motor truck manufacturers for use in their wheels:

Peerless, Packard, Kelly, Seagrave, Atterbury, Babcock, Blair, Mack, Brockway, Chase, Hatfield, Harwood-Barley, Jeffery, Kissel, Mais, Poyer, Modern, Reo, Rowe, Sanford, Schacht, Selden, Service and many others.

The Rolls of S.R.B. Taper Roller Bearings offer an effective bearing surface over their entire length, thus giving the bearing a greater radial load capacity for a given width of bearing than is possible with any other design.

The large shoulder on the Cone allows of the bearing taking a maximum end thrust with a minumum wear.

For prices and further data, write,

STANDARD ROLLER BEARING COMPANY, Philadelphia, Penna.

BALL~ BEARINGS

HB DWF

The Hess-Bright Manufacturing Company

Pioneers in the introduction of Annular Ball Bearings

Most extensive resources and plants in existence devoted exclusively to ball bearing manufacture. Enlarging and improving facilities, product and capacity for distribution.

Main Offices and Plant No. 2 on line of Penna. R. R. to New York
41 E. Erie Avenue, Philadelphia, Pa.

Stores for Retail Distribution:

PHILADELPHIA	NEW YORK	CHICAGO
668 North Broad Street	1974 Broadway	1800 Michigan Avenue

When Writing, Please Say—"Saw Your Ad. in the C C J"

REAR WHEEL SPROCKETS AND DRUMS

Cast in One Piece

Deliveries beginning one week to ten days

Tensile Strength
70,000 lbs.

Elastic Limit
40,000 lbs.

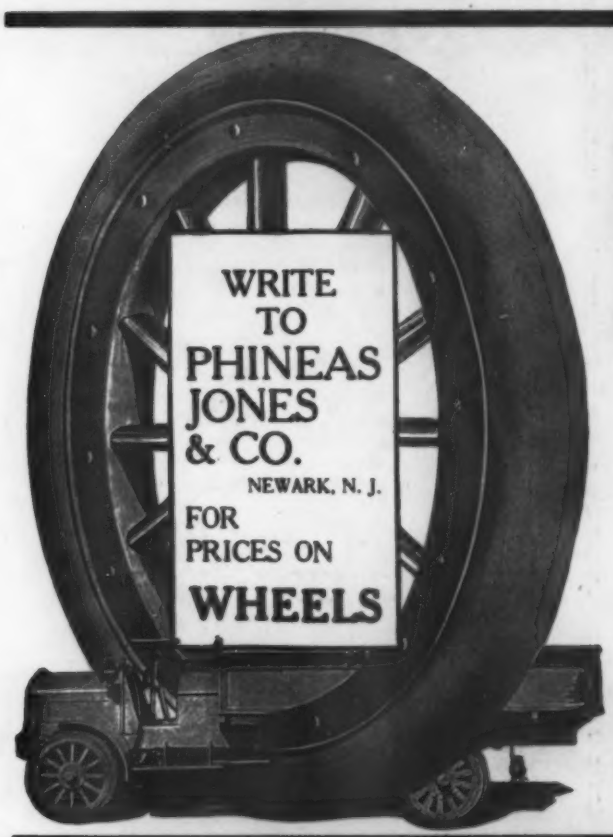
Elongation
20%

Reduction
30%

SAVE MACHINING TIME BY BUYING THE BEST

Radius Rods
Jack-Shaft Hangers
Front Axles
Worm-Drive Housings
Spring Hangers
Brake-Band Spiders

Michigan Steel Casting Co.
DETROIT MICH.



AUTOMOBILE WHEELS for PLEASURE CARS and TRUCKS

Repairing and truing old wheels a specialty

Experimental wheels a specialty

We furnish and apply any style demountable or detachable rim or tire

BEST ON EARTH—KANTSAMORE
ESTABLISHED 1855

PHINEAS JONES & COMPANY

305-313 Market Street :: Newark, N. J.
Branch Factory: 12th Avenue and 55th Street, New York City

Special Proposition to Dealers
Expires in 3 Months

Our **Motor Truck Sales Department** has formulated a special plan covering the representation and sale of A. & R. Motor Trucks throughout the United States.

This plan includes:

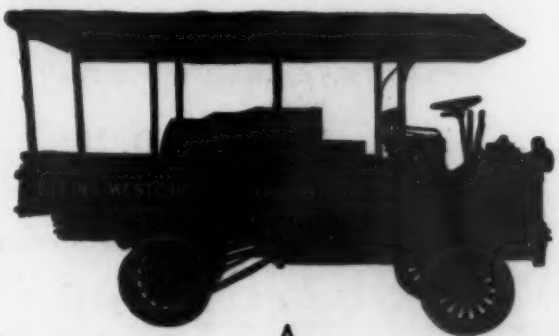
A—The allotting of selling territory;
B—Offers you a special price on your demonstrating truck;
C—and thoroughly covers a time-limited, added-profit offer, to Dealers.

This special A. & R. proposition will be extended to Dealers for three months, at the conclusion of which period we will withdraw the offer.

We would suggest that you act quickly.

Read the specifications of the A. & R. 3, 4 and 5 ton Trucks given below.

They supply the most convincing reasons why you should write today for facts and figures.



General Specifications

MOTOR: Four cylinders; 40 H. P. by S.A.E. formula, 350 to 950 R.P.M., positive speed-control governor. High tension waterproof dual ignition. Carburetor air supply heated. Oil-forced feed to main bearings, sight feed on dash.

COOLING: Honeycomb type radiator of great strength and proportions, ball bearing fan, gear-driven centrifugal pump.

BEARINGS: Annular ball and roller throughout. Parsons' white bronze in motor.

SPRINGS: Oil-tempered tri-alloy steel, rear 55" length. Bolster spring in front and cross, jackspring in rear, operating after 2/3 load is reached. Shackles unique, positively indestructible, no bolts to wear or break. Grease cups on all wear plates.

BRAKES: Four large brakes. Service brakes contracting on bronze drums at end of jackshaft. Emergency expanding both rear wheels. Linings of special friction material, easily demounted and relined, great leverage and quick action.

AXLES: Solid forgings, Chrome nickel steel, Timken roller bearings. Extra heavy drop-forged steering knuckles, hardened pins and bushings.

CLUTCH: Large leather-faced cone with cork inserts. Impervious to atmospheric conditions, quickly inspected and removed.

FRAME: Hot-rolled alloy steel, all braces hot-riveted.

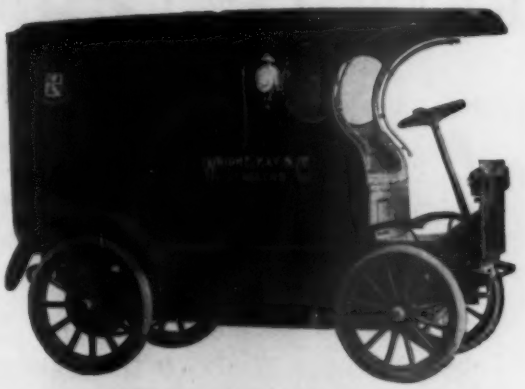
DRIVE: Short nickel-steel shaft transmission, with two universal joints, Vanadium steel jackshaft, large sprockets, large side chains to rear wheels. Absolute direct line of power from engine shaft to rear wheels, developing maximum power at all times.

STEERING CONTROL: 22" hard rubber wheel, extremely easy, allowing truck to turn in its length and a half and practically indestructible.

IMPORTANT: The A. & R. Motor Trucks are fully guaranteed by the

ABENDROTH & ROOT MFG. COMPANY
Since 1867

Works at Newburgh, N. Y. **46 Church St., New York**



Just One Moving Part

The Detroit Electric motor has just one moving part and that is rotary. Compare this with the gasoline type of motor with its many moving parts, requiring constant adjustment and daily oiling.

The principles of Detroit Electric construction eliminate explosive combustion with its attendant vibration and consequent wear and tear. No spark plugs, no carburetor, no radiator or pump, no complex oiling system and no clutch to keep adjusted and working harmoniously.

Electricity is now the cheapest form of motive energy. It is also the safest, most convenient, most easily controlled.

It is not necessary to accelerate the motor to change speeds, nor is there any danger of the motive power "stalling"—a common cause of accidents.

The average daily speed of the electric in city traffic is high, because of its quick get-away and ease of handling.

City deliveries as a rule, mean many stops and for this purpose the electric has no serious competitor.

The Detroit Electric is odorless and noiseless and for this reason makes a favorable impression with your customers.

If you will give us an idea of the daily mileage and outline of service you require, we can give you definite and certain figures as to the cost of operation —a feature well worth your consideration.

Catalog and detailed information will be gladly furnished to any business concern upon request.

THE Detroit ELECTRIC

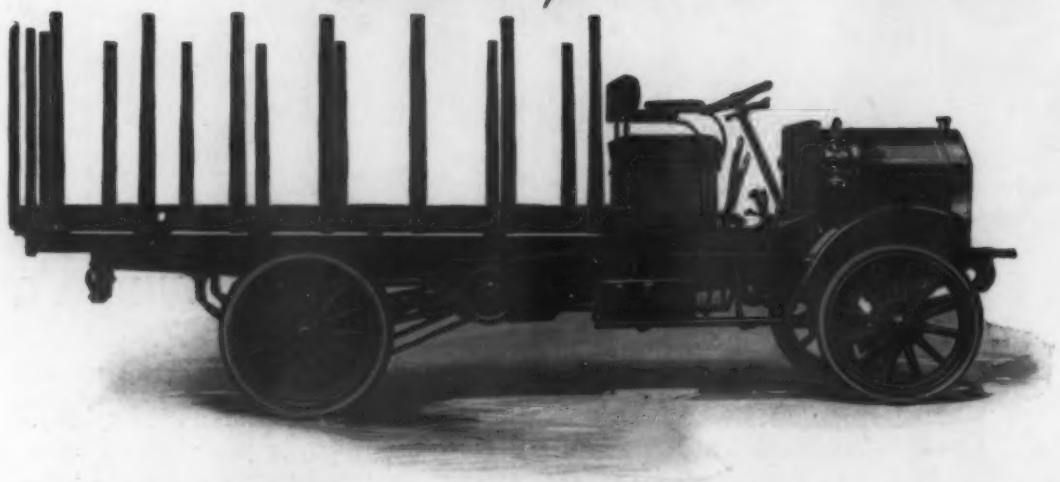
Anderson Electric Car Company
456 Clay Ave., Detroit, Mich., U. S. A.

BRANCHES:

Boston	New York:—Broadway at 80th St.	Evanston
Buffalo	Chicago:—2416 Michigan Avenue	Kansas City
Cleveland		Minneapolis

Selling representatives in 175 leading cities

2 Ton THE Rockford Price $2,500



Considering quality, this truck is the best value in the market to-day. Every part selected with the greatest care, regardless of cost. Ask us for particulars. A few good agencies are open.

ROCKFORD MOTOR TRUCK CO. :: ROCKFORD, ILL.

CULLMAN SPROCKETS and Differentials

in stock and to order.

Send for catalog and let us quote you on your requirements.

CULLMAN WHEEL COMPANY, CHICAGO

1351 GREENWOOD TERRACE

When Writing, Please Say—"Saw Your Ad. in the C C J"

Brewers That Believe in "*Electrics*" and Rely on The "Exide" Batteries

"Exide" "Hycap-Exide"
"Thin-Exide" "Ironclad-Exide"

Here is a list of prominent brewers who have found that electric trucks furnish a most efficient and economical service and for the same reason use the "Exide" Batteries.

Chattanooga Brewing Co., Chattanooga, Tenn.
Jackson Brewing Co., New Orleans, La.
Stroh Brewing Co., Detroit, Mich.
George Wiedemann Brewing Co., Newport, Ky.
Moerlein Brewing Co., Cincinnati, Ohio
Dayton Breweries Co., Dayton, Ohio
The Belmont Brewing Co., Martins Ferry, Ohio
Louis J. Bergdoll Brewing Co., Philadelphia
F. A. Poth & Sons, Philadelphia
C. Schmidt & Sons Brewing Co., Philadelphia
Finkenauer Brewing Co., Philadelphia
A. Erdrich & Sons, Philadelphia
American Brewing Co., Philadelphia
Adam Scheidt Brewing Co., Norristown, Pa.
Roessle Brewery Co., Boston, Mass.
Holland Wine Co., Boston, Mass.
Central Brewing Co., New York City
Loewer's V. Gambrinus Brewery Co., New York City
Jacob Ruppert Brewing Co., New York City
Ebling Brewing Co., New York City
Geo. Ehret, New York City
Beadleston & Woerz, New York City
Bernheimer & Schwartz, New York City
Otto Huber, Brooklyn, N. Y.
Excelsior Brewing Co., Brooklyn, N. Y.
Ballentine Brewing Co., Newark, N. J.
Anheuser-Busch Brewing Association, St. Louis, Mo.
Ruhstaller Brewing Co., Sacramento, Cal.
Eldorado Brewing Co., Stockton, Cal.
John Gund Brewing Co., La Crosse, Wis.
Dubuque Brewing & Malting Co., Dubuque, Ia.
Cook Brewing Co., Evansville, Ind.

The people who buy batteries in the largest quantities are the best judges of the best battery to use

Write our nearest office and let us help you in choosing the proper type of "Exide" Battery for your particular service

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of The "Chloride Accumulator," The "Tudor Accumulator," The "Exide," "Hycap-Exide," "Thin-Exide," and "Ironclad-Exide" Batteries.

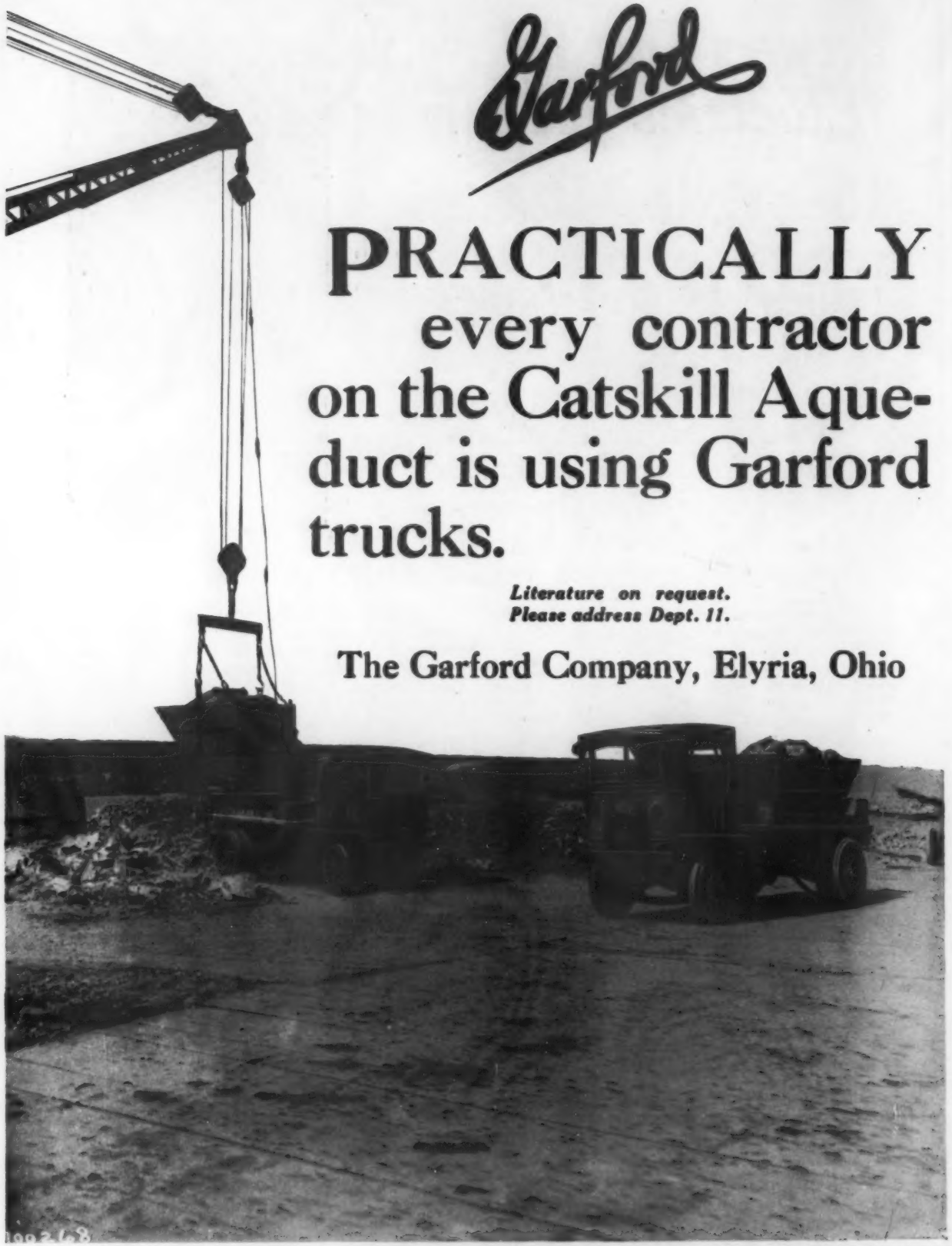
New York Boston Chicago **PHILADELPHIA, PA.** Denver San Francisco Seattle
St. Louis Cleveland Atlanta Detroit **1888-1913** Los Angeles Portland, Ore. Toronto
876 "Exide" Distributors 9 "Exide" Depots "Exide" Inspection Corps

Garford

PRACTICALLY every contractor on the Catskill Aqueduct is using Garford trucks.

Literature on request.
Please address Dept. 11.

The Garford Company, Elyria, Ohio

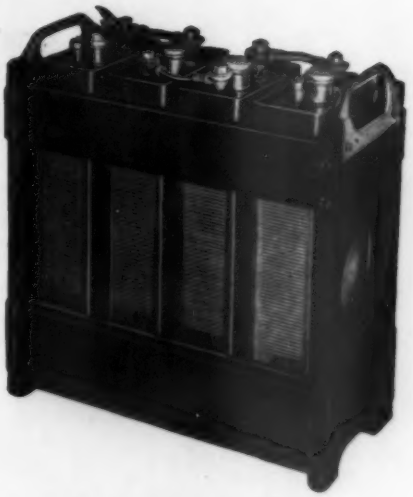


When Writing, Please Say—"Saw Your Ad. in the C C J"

Rule, Rule, Rule

vs.

Rules, Rules, Rules



The following are the Rules for Maintaining Edison Storage Batteries.

Rule I
Replace evaporation by adding distilled water when necessary to keep plates covered.
Rule II
Renew electrolyte every eight months in Vehicle Batteries — every year or so in Ignition, Lighting and Starting Batteries.
Rule III
Keep the outside of steel container reasonably clean.

Guaranteed for 4 years in Vehicle Service.

Compare with the maintenance of others.

Edison Storage Battery Company

141 Lakeside Ave. **Orange, N. J.**

WRITE FOR INFORMATION ON THE EDISON ALTERNATING CURRENT RECTIFIER FOR CHARGING IGNITION AND LIGHTING BATTERIES

GMC

TRUCKS

THE Cudahy Packing Company own and operate fifteen G M C heavy-duty trucks in various parts of the country. The last two were shipped to the Cudahy branches in Pittsburgh and Philadelphia.

The experience of the Cudahy Packing Company is a record of satisfactory service. First one truck was tried out. It made good. And, as a result, others of the same make were ordered as additional equipment was needed. It is also a matter of interest that the tests were made under a variety of driving conditions. Kansas City and Pittsburgh have hilly, rough streets. Ordinary service is much more severe in these cities than in Philadelphia and Chicago.

A truck that will give a good account of itself when the work is exceptionally hard is a good truck—one that may be depended upon to move *your* goods satisfactorily day after day, at a cost which you will agree is reasonable, considering the service.

G M C Electric trucks are also doing excellent work in the service of packers and wholesale butchers.

Let us send you facts and figures bearing on the money-making possibilities of G M C trucks in your haulage or delivery.

G M C Trucks are backed by the largest manufacturers of motor-propelled vehicles in the world

GENERAL MOTORS TRUCK COMPANY

Pontiac **Michigan**

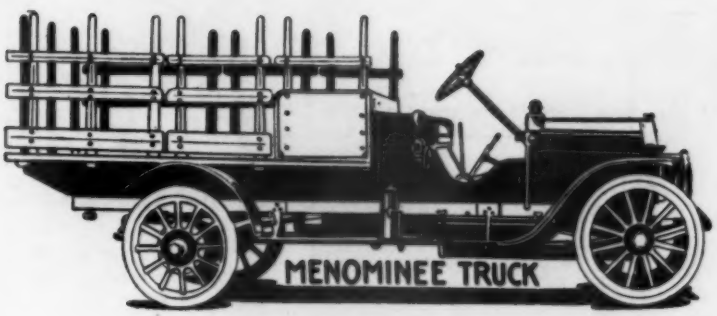
Makers of gasoline and electric trucks of all capacities

BRANCHES:—New York Boston Philadelphia Detroit Chicago Kansas City St. Louis

GMC

When Writing, Please Say—"Saw Your Ad. in the C C J"

"THE MENOMINEE"
Motor Trucks



1500 lbs.—Carrying capacity complete with Express or Stake Body - - **$1200.00**

2000 lbs.—Carrying capacity complete with Express or Stake Body - - **$1500.00**

3000 lbs.—Carrying capacity complete with Stake Body - - - - **$1950.00**

THE INTRODUCTION OF "THE MENOMINEE" TRUCK—

was a revelation in delivery motor car development — a demonstration of practicability in motor delivery and facility to render better service.

Combining beauty, strength and utility, it has been most favorably accepted by Department Stores, Grocers, Meat Dealers, General Merchants and Transfer Men, and can now boast of more cars in use than any other truck of its size and price on the market.

4-Cylinder Unit Power Plant

Sliding-Gear Transmission

Shaft Drive, Transmitting Through Special Reduction Gear

Full-Floating Rear Axle

The season when motor trucks are mostly desired is here, do not delay sending your orders. Try us for prompt delivery and service.

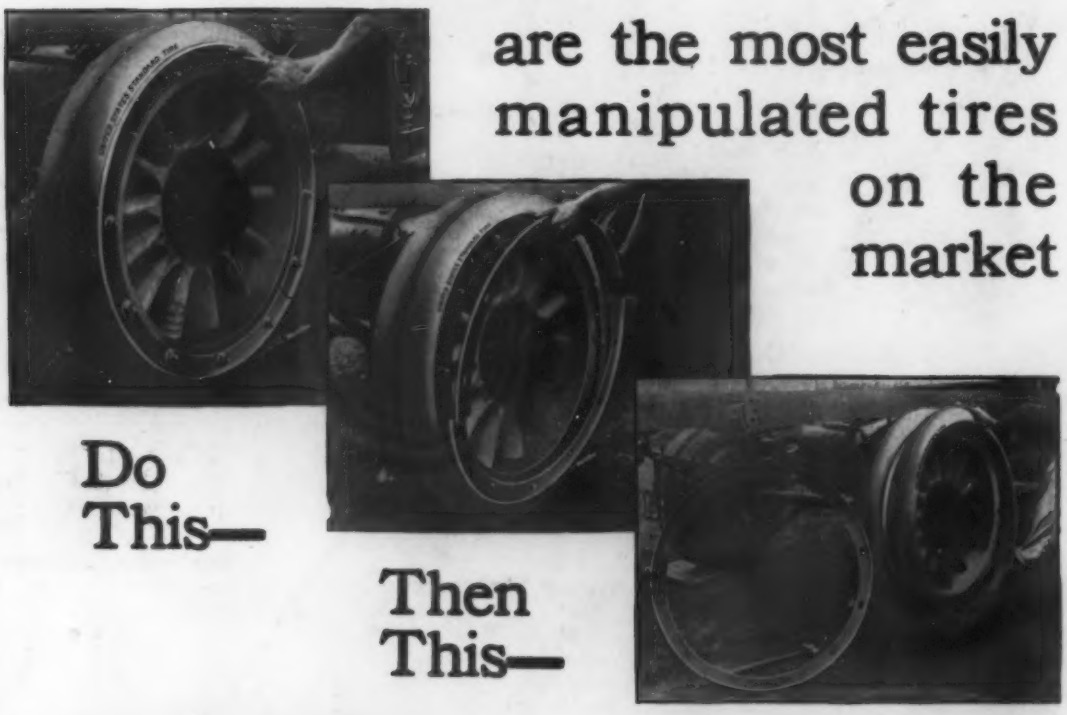
GOOD TERRITORIES STILL OPEN FOR AGENCY PROPOSITIONS

D. F. POYER COMPANY

MENOMINEE **MICHIGAN**

United States Standard Motor Truck Tires

(Demountable)



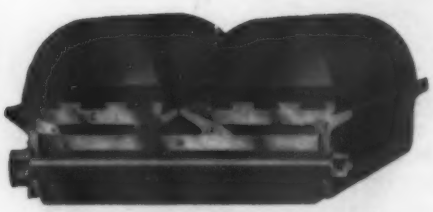
are the most easily manipulated tires on the market

Do This—

Then This—

Then This—

and your Tire is off



Cross Section of the United States Standard Motor Truck Tire

Absolutely Guaranteed for 10,000 Miles

Conditional upon this mileage being used within one year

UNITED STATES TIRE COMPANY, New York

3 YEARS AHEAD

GIBNEY WIRELESS TIRES

SINGLE OR DUAL

Engineers and designers are working day and night to keep abreast of the rapid changes and improvements in the automobile.

Tire manufacturers are doing the same in their endeavor to catch up with the GIBNEY WIRELESS TIRES; but they started too late. It took them three years to see that the GIBNEY WIRELESS TIRE was the best solid tire construction.

In the meantime, GIBNEY'S have established a reputation for efficiency and economy, and each day the demand for them is increasing by leaps and bounds.

Dealers, write us for exclusive agency proposition. It will put you **3 years ahead.**

GIBNEY TIRE & RUBBER COMPANY

Factory: CONSHOHOCKEN, PA.

PHILADELPHIA
BOSTON
NEW YORK
MINNEAPOLIS

When Writing, Please Say—"Saw Your Ad. in the C C J"

How Much is it Costing You to Operate Your Motor Trucks?

You can know exactly for each trip, each day, each month, each year. You can check up every expense, and keep the record for comparison with other records later on—you can see where economy is needed. You can be in absolute touch with your motor truck expense at all times by the use of

These Record Forms—Free to You

The large form illustrated below (actual size 11 x 17 1-2 in.) is in book form and is a monthly report made up each day from the Driver's Daily Card, also shown below.

The service record of these tires will convince you of their superiority if you compare it with the record of other tires. We offer you more mileage — continuous service not continual adjustments—at the lowest cost per mile.

Write today for a supply of Record Cards and a Record Book

Also ask for either or both of these books if you are interested.

"Motor Trucks of America"
the most valuable hand book of Motor Trucks ever published. Gives pictures, specifications and essential features (furnished by the makers) of over 60 American made trucks. Authentic and up-to-date for 1913.

"Goodrich Wireless Demountable Truck Tires"
42-page illustrated book giving convincing facts and figures of how you can save money and gain efficiency through the use of Goodrich Wireless Truck Tires. Write for a copy on your business stationery.

The B. F. Goodrich Company

There is nothing in Goodrich Advertising that isn't in Goodrich Goods

Factories: AKRON, OHIO
Branches in all principal cities

Makers of Goodrich Tires and Everything That's Best in Rubber

They once looked good, we never did surmise—
Their days were numbered—but now we're wise.
The truck has chased the livery man
And BOWSER has displaced the can.

You displaced your horse-drawn vehicles because convinced that the truck was quicker, cheaper, cleaner and more economical for the distance traveled and the loads hauled and, in fact, better in every way and, since using, your conviction has undoubtedly been vindicated.

But are you really getting maximum service from your gasolene trucks? You may reasonably think so from the fact that, comparing it with the horse-drawn vehicles, the figures are all in favor of the gasolene truck. Sometimes figures don't tell all the story.

SOME THINGS WITH WHICH YOU WILL AGREE

Gasolene engines of today are practically perfect—they are built to develop different horse power according to the bore and stroke—they develop that horse power if supplied with the right kind of gasolene, that is—gasolene that contains the maximum power-driving vapor. It is the unreleased vapor you buy—otherwise why not run your trucks on naphtha and save more than half your present bills?

BOWSER SAFE OIL STORAGE SYSTEMS

will keep all the power-producing vapor in your gasolene and all the "velvet" in your oils. Why? Because twenty-eight years of "know how" are built into them.

Bowser outfits are tireless iron clerks that are at your instant service twenty-four hours a day—they never make a mistake and accurately measure and record every drop bought and used.

OVER A MILLION BOWSER USERS AND BOOSTERS

Do you think this army of friends could exist without a cause? Write for our free illustrated book and learn more about this subject. It will save your liquid money —your oils—just as the knowledge of finance saves your cash. This inquiry does not obligate you in the least. Do not hesitate to write for it today.

S. F. BOWSER & CO., Inc.

HOME PLANT AND GENERAL OFFICES

Box 2118 FORT WAYNE, IND., U. S. A.

Sales Offices in all Centers and Representatives Everywhere

Original patentees and manufacturers of standard, self-measuring, hand and power-driven pumps, large and small tanks, gasolene and oil-storage and distributing systems, self-registering pipe-line measures, oil-filtering and circulating systems, dry-cleaners' systems, etc.

ESTABLISHED 1885

CRAMP

Gear Bronzes

Metals look much alike. Before buying metals it is vitally important to consider the experience and reputation of the manufacturer;—to know that the metals you use possess the qualities that will stand up in service and give the maximum of efficiency and wear.

The name CRAMP has for nearly a century set the highest standard in bearing metals. Cramp's metals are the result of almost a hundred years' experience. They have been used during these hundred years for worm drives for every type of machine—from turret turning gear to lifting bridges, elevators, marine railways, etc.

Cramp's metals will give longer life—resist wear and abrasion better—will withstand excessive strain and shock and heavier starting torque than any other gearing metals. Through merit alone Cramp's metals have achieved dominant place as the world's best metals.

It is no advantage to import metals, we manufacture absolutely the best, and save you duty, freight and time.

We furnish the metals and castings for Hindley Spiral Gears.

Write us—we can show you how Cramp's metals will better your products.

Parsons' White Brass and Cramp's Special Bearing Bronze

Acknowledged the world's best bearing metals

Specify PARSONS' WHITE BRASS for main engine and crank-pin bearings, and CRAMP'S SPECIAL BEARING BRONZE for wrist-pin, cam-shaft, transmission bearings, valve-stem guides and similar bearings

WRITE FOR PAMPHLETS AND PRICES

The Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.

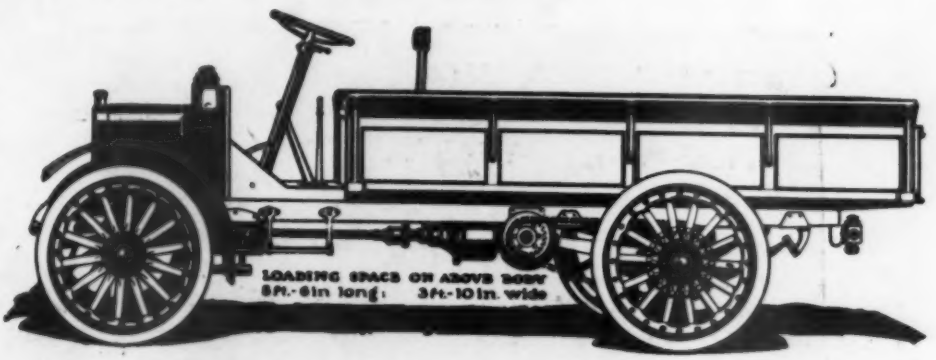
When Writing, Please Say—"Saw Your Ad. in the C C J"

Commercially Right

The New MORA

In Other Words— **A THOROUGHBRED BUSINESS WAGON**

ABSOLUTELY PRACTICAL—is still another way to interpret our slogan "Commercially Right." It means a *usable* wagon giving real service and real economy,—and from a mechanical standpoint, a wagonload of *do-the-work* features bound to stand the racket. It's the logical result of practical business brains combined with an experienced "know how" of power propulsion as applied to this kind of service.



Price

$1400

Chassis

The MORA motor is the real business end of a real business wagon — built about 35% heavier in its working parts than is the generally accepted engineering practice for pleasure car motors of the same size. Cast *monobloc*, simple and compact. Long stroke, 4-cylinder of 25 H. P. One of these devils that gets right down and pulls.

Express

2000 Lbs.

Service

Puts $400 Back into Your Pocket—Mr. Retail Buyer

You save at least $400 when you get a MORA—for you can't duplicate MORA value for less than $1800—and you can't get better value at any price. Not a lot of frills and fancies, understand, but good, substantial, serviceable value that means business.

You buy a vehicle that's healthy to the core, and while you save money in the purchase price, the fact that the MORA's built on sound principles saves you still more money in actual service.

The MORA's a business machine pure and simple, built by a concern making commercial cars solely and specializing on this one type. All our facilities and capital, all our brains and energy are concentrated on making the MORA the one best vehicle for Express Service. That accounts for MORA value and why the MORA *is* "Commercially Right."

You ought to get further details. The Coupon's handy.

The MORA Power Wagon Co.

5326 St. Clair Avenue
CLEVELAND, OHIO

DEALERS

YOUR ONE BIG CHANCE

This Coupon will start you Right—Mail it TODAY

The MORA P. W. CO.
5326 St. Clair Ave.
Cleveland, Ohio
Send further details to

Name_____

Street _____

Town _____

CCJ—6-13

BROWN
Commercial Cars
SELL ON MERIT

A STANDARD BODY, PRICE COMPLETE, $1850. With Other Body Styles, $1775 to $1850

MEETING COMPETITION IN YOUR TERRITORY

demands the best that your customers' money can buy—exactly what every BROWN DEALER has to offer. Talk helps sell cars—but it must be backed up by FACTS. The dealer who handles the best car made at the price, is ***bound*** to ***win out*** in the long run.

We want every progressive dealer to submit the BROWN Delivery Car to the most searching tests and comparisons possible—and decide whether he prefers to COMPETE with BROWN Cars or SELL them.

Write us—the facts in the case can be had for the asking

BROWN COMMERCIAL CAR CO.
PERU, INDIANA

Two Stewart Trucks, with express body, used by Hudner Markets, Fall River, Mass.

STEWART DELIVERY TRUCKS are now in operation in 50 cities in the United States, Canada and South America, and we do not know of a single dissatisfied user.

Some of the largest and best concerns in the country are using Stewart delivery trucks. The New York Telephone Company is operating 9; Taylor Ice Cream Co., Buffalo, has purchased 6; the South Park Commission, Chicago, 2; Diamond Laundry, Los Angeles, 2, etc., etc. Everywhere they are giving the kind of satisfaction that brings repeat orders.

Stewart
Delivery Trucks

Now is the time to convince merchants to adopt motor delivery. Now is the time when Stewart orders come easy. Merchants in many lines are looking for just such a truck as the Stewart.

Are you ready to take advantage of this state of affairs? Are you ready to supply the demand—that exists ***right now*** in your community—for this high-grade, well-made, moderate-priced delivery truck?

Stewart delivery trucks are quick sellers and big money-makers, because they are just what merchants in every class of business need and are looking for.

They are economical, reliable and profitable to use, easy to handle, quick to start and stop, quiet and smooth-running.

They are handsome and stylish and make the best advertisement the progressive merchant can have. Scores of the most progressive dealers in the United States and Canada are now selling Stewart Delivery Trucks—dealers who know cars, who handle such high-grade cars as Alco, Packard, Chalmers, Franklin, Cadillac, Hudson, etc.

The field is big; the harvest waiting to be gathered. You may still have a chance to take on the best money-making delivery truck in the commercial car industry. It is worth your while to find out. So send at once—today—for our catalog and liberal proposition to dealers.

Specifications

30 H. P. Continental motor, 3¾" x 5¼"
Bosch magneto
Brown-Lipe transmission
Timken axles
Demountable rims
35" x 4½" tires
Wheelbase, 126"
Left-hand steer, center control
7-ft. loading space
Bodies to suit all businesses

Mail Coupon or write us NOW! C.C.J.

Stewart Motor Corporation, Buffalo, N. Y.

Please send literature and dealership proposition.

Name . . . . . .
Street . . . . . .
City . . . . . State . . . .

Stewart Motor Corporation, Buffalo, N. Y.

T. R. Lippard, Pres. & Mgr.; R. G. Stewart, V. P. & Chief Eng.; R. P. Lentz, Sec. & Treas.

When Writing, Please Say—"Saw Your Ad. in the C C J"

POLACK

WESTERN UNION

Form 2260

RECEIVED NO. | TIME FILED | CHECK

NIGHT LETTER

THEO. N. VAIL, PRESIDENT

SEND the following Night Letter, subject to the terms on back hereof, which are hereby agreed to

X 13 E

A592 B AHC 58 NL

BALTIMORE MD MAY 7 15

POLACK TYRE CO.,

246 W 59 ST NEW YORK.

REG TO SUBMIT OFFICIALLY POLACK TIRES AT END OF THIRD DAYS RUN HAVE MADE A PERFECT SCORE GOVERNMENT OFFICIALS RIDING ON TRUCK TODAY REMARKED POLACK TIRES RODE AS EASY AS PNEUMATIC AND SHOW MORE RESILIENCY THAN OTHER MAKE SOLID TIRES.

J T LEWIS OFFICIAL OBSERVER MAIS TRUCK

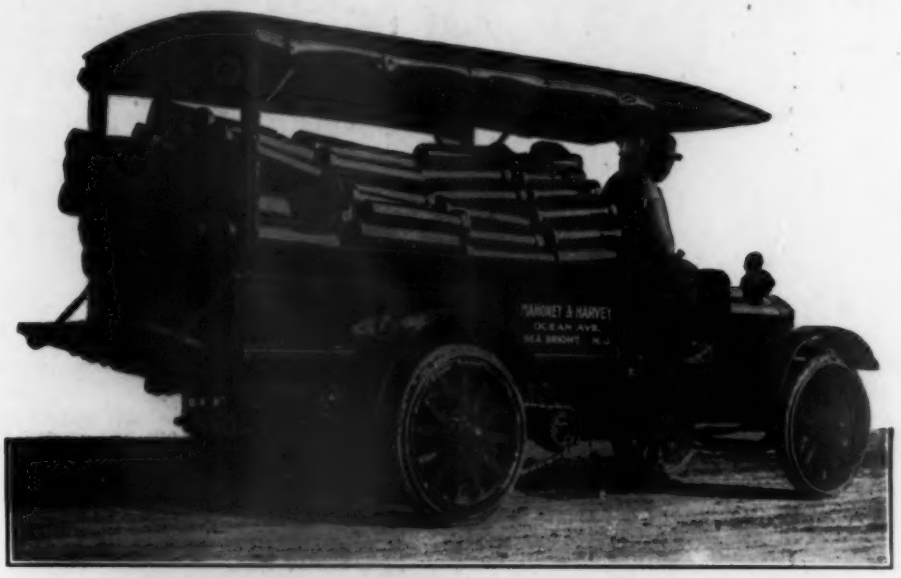
1040 P

Polack Tyre & Rubber Co.

Principal Offices: 246 West 59th Street, New York

Boston, Philadelphia, Chicago, Kansas City, Factory: Bridgeport, Conn., St. Louis, Baltimore, Washington, Detroit

Universally Acknowledged as the Best One Ton Truck on the Market



The Selden Truck for $2000

affords agents a business opportunity never equalled in the motor truck field. The Selden is a sturdy truck built along practical lines, embodying every feature which stands for *Durability and Economy*. In addition, it actually *earns its own cost*, as the Selden is

Sold on the Time Payment Plan

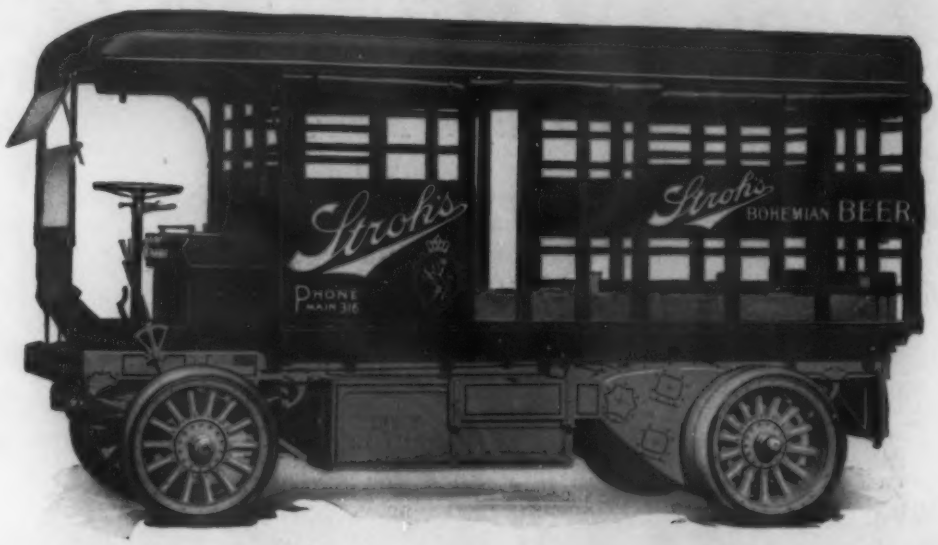
$500 is the initial investment required; the monthly payments are earned by the truck itself. A careful and actual study of costs has proven that almost every wholesaler, manufacturer and large retailer can use a Selden Truck economically. Our Sales Plan enables any firm to purchase a Selden Truck without inconvenience.

This combination of Quality Truck and Original Sales Plan means money for agents and we want Agents in unassigned territory. Write today giving sales and service facilities.

SELDEN TRUCK SALES COMPANY

210 East Avenue **ROCHESTER, N. Y.**

Baker Electrics



Baker Electric Trucks

Total Repair Cost for One Year—60c

That's the *repair economy record* of a one-ton Baker Electric Truck doing hard, heavy, daily service over the roughest spots of Chicago.

In Cleveland a two-ton Baker is doing the work on $9 a week (exclusive of driver's pay) that formerly cost $75 a week under a horse truck system.

Actual performance (not salesmen's claims) has proved the Baker the most economical means of merchandise delivery.

Their long life and low current and upkeep costs are the reasons back of the service economy of Baker Trucks.

These are facts you ought to discuss with us (either personally or by mail) whether your present equipment is horse-drawn or gasoline. We can show you some surprising figure and fact contrasts against both.

Our book "Why An Electric Truck?" sent Free

Baker Models for all service from 500 pounds up to four tons capacity; also tractors up to eight tons haulage capacity.

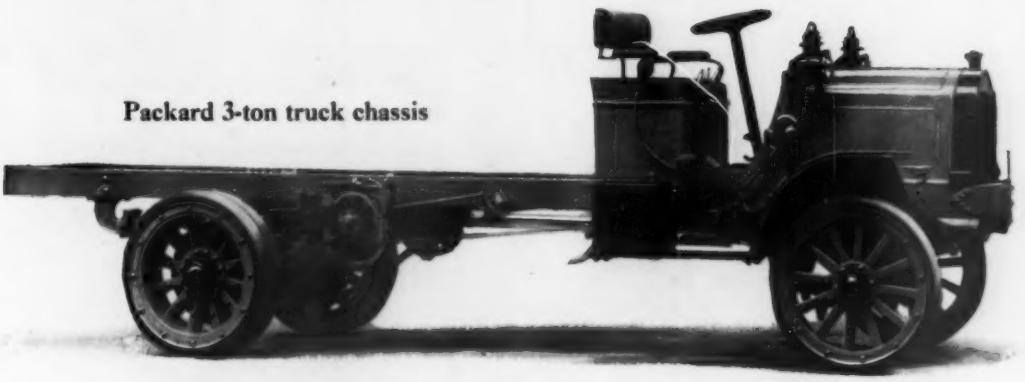
The Baker Motor Vehicle Co., Cleveland, Ohio

CANADA: The Baker Motor Vehicle Company of Canada, Ltd., Walkerville, Ont.

Makers also of Baker Coupes, Victorias, Broughams, etc. *Represented in principal cities*
Applications solicited for representation in open territory

Study the Price of Parts

Packard 3-ton truck chassis



Two-ton chassis . .	$2800
Three-ton chassis . .	$3400
Five-ton chassis . .	$4500

F. O. B. Detroit

The total list price of all parts, less tires, that make up a three-ton Packard truck chassis is less than the list price of the assembled chassis

Ask the man who owns one

Packard Motor Car Company, Detroit

Is the Universal Motor Truck a Good Investment?

Absolutely.

Whether you are a prospective owner or dealer, it will pay you to go over carefully the construction of the Universal Motor Trucks.

They are the products of the largest factory in the country devoted exclusively to the manufacture of gasoline commercial vehicles.

They have been designed to meet particular conditions, incident to heavy trucking.

Every part is of a selected quality—of material which we have found by repeated tests to be the best for that particular part of the mechanism.

Universal trucks have plenty of speed and power, and are thoroughly reliable.

Accurate tests with all kinds of outfits, followed by a careful analysis of results have proved that Universal Motor Trucks furnish the logical and most economical solution of the trucking problem.

For long hauls especially, Universal two-ton and three-ton trucks are great money savers and money makers.

Universal Motor Trucks

They can be loaded and unloaded quickly.

The loading floor is nearer the ground than that of most trucks.

Universal Motor Trucks are displacing team outfits in all lines of business every day.

How Many Types Do You Build?

We build three chassis—

A one-ton worm-gear drive, which really has 1½ tons capacity and sells for, $1950.

Price with Standard Express Body - - - - -	$2050	Two-ton chassis - - - - - - - - - - -	$2800
Price with Standard Stake Body - - - - - -	$2000	Three-ton chassis - - - - - - - - - - -	$3400

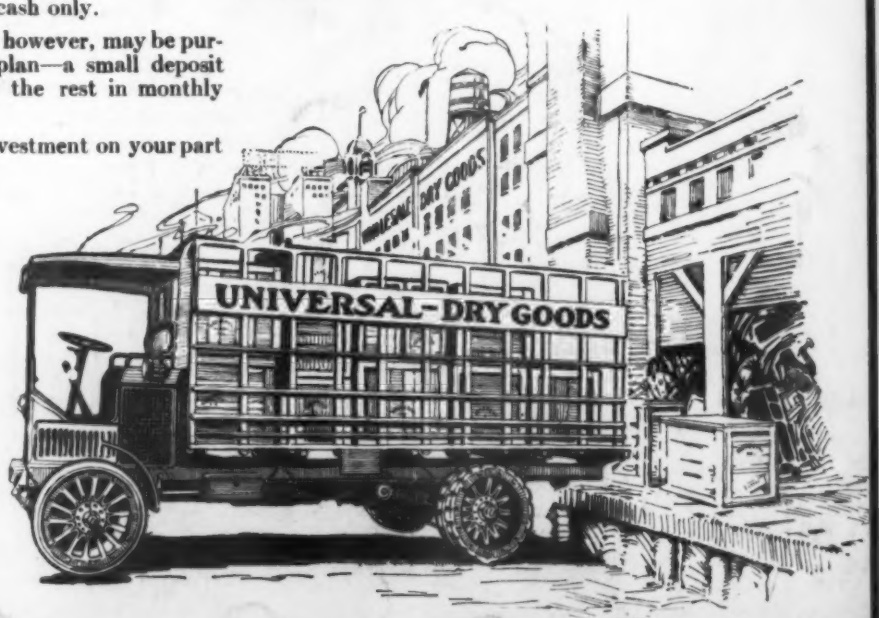
PRICES F. O. B. DETROIT

The one-ton truck is sold for cash only.

The two and three-ton trucks however, may be purchased on a special payment plan—a small deposit upon delivery of truck, and the rest in monthly payments.

Thus, it means but a small investment on your part to get the best truck on the market under exceedingly favorable conditions.

If you are a dealer, you will be interested in our special selling plan.



Universal Motor Truck Company

507 THEODORE STREET
DETROIT MICHIGAN

Fred K. Parke, General Manager